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ON THE

NATURE AND TREATMENT

OF

SOFTENING OF THE BRAIN.

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BY

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PREFACE.

In publishing the following Treatise, I gladly take the opportunity of acknowledging the kind assistance afforded to me, in the microscopical investigations, by Mr. Wharton Jones, Dr. George Johnson, Mr. Taunton, and Dr. T. W. Jones. I am, likewise, under great obligations to several gentlemen who supplied me with specimens of diseased structure. To Dr. Diamond, of the Surrey County Asylum, I am especially indebted in this respect, and also for the opportunity of witnessing the various forms of Cerebral Disease in the extensive establishment which he so ably conducts; and which affords a happy example of the complete efficacy of the non-restraint system in Insanity, when under the guidance of skill, science, and humanity.

R. R.

9, Woburn Place, Russell Square,
20th September, 1851.

ON THE

NATURE AND TREATMENT

OF

SOFTENING OF THE BRAIN.

THERE are several circumstances in the history of cerebral affections that render their study one of peculiar difficulty. The means of discovering their character and seat are less perfect than in many other disorders; for the brain is but little within the reach of physical examination, and there is such a general resemblance in the symptoms of its different lesions, that it is often no easy task to mark their distinguishing features. So closely connected, too, are the organs subservient to the various cerebral functions, that even when the disease is strictly limited, the sympathies of other parts are almost necessarily awakened. Hence arises that endless variety of disturbance which at once astonishes and confuses, and gives to this class of affections that Protean character which so generally belongs to them.

The researches of modern physiologists have, it is true, greatly diminished these perplexities, and many morbid manifestations formerly regarded as hopelessly obscure, and apparently contradictory, are now capable of a satisfactory explanation. Our country has contributed its full share of that physiological knowledge, which is capable of lending essential aid to the practical physician. The discoveries of Sir C. Bell and Dr. Marshall Hall are pre-eminent in this respect. The latter author in particular has brought to view a series of nervous actions of surpassing interest and importance, and which are capable of the most varied and extended application in the diagnosis and treatment of disease.

Among nervous affections, there is perhaps none whose symptoms and nature are less distinctly defined, than softening of the brain. The term ramollisement is often employed very vaguely, and seems to be appropriated to any combination of cerebral symptoms that is hard to interpret. Even those who have paid most attention to the malady hold different opinions of its nature, especially in regard to its alliance with inflammation. The symptomatology of the affection, too, remains in considerable obscurity, and is sometimes confounded with that of other cerebral lesions. I propose in the following pages to make a careful analysis of the facts bearing upon this important disease, and, if possible, to arrive at its separate and individual history.

The merit of bringing this complaint into general notice is undoubtedly due to Rostan. As physician to the Salpietriere at Paris, an hospital chiefly devoted to aged females, he had constant opportunities of observing this condition of the brain, at least in that phase which it presents in advanced life. Some allusions to cerebral softening had however been previously made by contemporary writers. Recamier had noticed it as occurring in certain fevers; Rochoux had described a form of softening that he imagined preceded apoplectic effusions; Abercrombie had observed the lesion in connexion with meningitis. Pinel, Portal, and others had also noticed it incidentally.

Nor indeed had this morbid appearance entirely escaped the observation of the older pathologists. Some faint traces of its description are apparent in the earliest medical works. Bayle* notices it more distinctly. He says,—" Opinantur aliqui apoplexiæ causam esse mollitiem cerebri cum ejus substantia, partium insensilium unione soluta aut imminuta, flaccida est et adeo parum sibi cohæret ut fere diffluet." He cites a case which is a complete history of the disease, in regard both to its symptoms and pathology. Morgagni† also found central softening of the brain in one of his patients.

These scattered, and for the most part uncertain allusions do not in the least detract from the excellence of Rostan; on the contrary, they rather serve to shew the slight importance which the old physicians attached to this lesion, and how far they were from forming an adequate notion of its frequency and importance. Several writers of eminence have subsequently investigated the subject, among whom are Lallemand, Abercrombie, Cruveilhier, Copland, Durand-Fardel, and many others.*

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* Bayle, F., De Apoplexia, 1677.

† Morgagni, T. B., De Sedibus et causis Morborum, 1761. Epist. v. sec. 6.

In this country the French term ramollisement *(softening)* is in general use to designate this condition of the brain, which, however, has no pretensions beyond the analogous expression in our own language.

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* The following works form the principal Bibliography of the disease.

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Varieties of Cerebral Softening.—Several varieties of this affection have been proposed, founded either upon some theory of its origin, its symptoms, or duration. The principal of these are the idiopathic—symptomatic—inflammatory—non-inflammatory (which includes several sub-divisions)—apoplectic—ataxic—acute—chronic and latent softening.

Primary or Idiopathic Softening is seldom observed. In general the diminished cohesion of the cerebral substance is consequent on prior disease, either within the cranium or elsewhere. But although this is its prevailing character, I see no reason to deny its occasional occurrence as an idiopathic disease.

Sympathetic or Secondary Softening.—The conditions of which this affection is symptomatic will be named when its ætiology is considered.

Acute Softening.—It must be premised that acute softening is not necessarily inflammatory, but the term refers to the abruptness of the invasion and rapidity of progress of the disease, circumstances which might be independent of inflammation. The complaint may even take the acute form, although no active process of any kind is going on in the brain, in consequence of mental or bodily shock, or of the feebleness of advancing age; the diseased organ, being unable to sustain such additional burden, sinks under the pressure.

Inflammatory Softening. (Acute).—The signs of this variety are not always so clearly defined as might be expected, when an organ of such primary importance as the brain is threatened with destruction.

The disease is usually confined to a small portion of the organ. It may be seated either on the surface or in the central parts; in the former instance it is often combined with meningitis.

The softening in these cases is but a termination of inflammation; its peculiar signs are therefore but feebly portrayed at the beginning of the attack; they become more prominent as the destructive process advances, until at length the symptoms announcing the existence of the lesion, are fully displayed.

The attack is not often commenced with a distinct rigor, or the other phenomena that mark the onset of inflammation in vital organs. In some cases, however, there are acceleration of the pulse, heat of skin and scalp, and other signs of pyrexia, principally when the disease occupies the surface of the brain.

The first circumstance to excite attention is usually headache, which is not always severe, but it is excessively harassing. The pain seems to dart through the brain, or to proceed from the centre of the organ, occupying now one spot, and now another, but having no fixed seat; it is always paroxysmal, and sometimes intermittent.

Accompanying this symptom, there may be confusion of thought, and a settled apprehension that the mind will inevitably be destroyed: at night, restlessness, excitement, and delirium come on, and sometimes, a convulsive paroxysm. In some cases, sickness and vomiting accompany these symptoms.

Shortly afterwards, signs present themselves that are as the foreshadowings of the coming danger, marking the nature of the morbid process, and the point to which it is rapidly advancing. Unusual sensations are felt in one or both limbs of the same side; tinglings, prickings *(pins and needles)*, or numbness, with some degree of weakness, alarm the patient with threatenings of palsy. At this period the headache has probably fixed itself in one region, which in many cases is on the side opposite to that of the limbs whose functions are injured.

The second stage of the disorder now begins. The delirium and restless excitement, the feeling of apprehension or terror give way to stupor and indifference. The headache and vomiting cease, and the patient lies in a state of mental and bodily torpor. The memory fails; and there is great difficulty in comprehending questions, and recollecting words suitable for reply. The countenance is dull and heavy; the pupils contracted or dilated, and insensible to light; the features are sometimes distorted; the hemiplegia becomes more confirmed; the pulse is slow, often beneath the healthy standard; the skin, at one time flushed, is at another covered with a clammy sweat; the tongue is reddish, inclined to dryness; the appetite bad, or little heed is paid to its demands; the bowels are constipated.

The further progress of the disease varies in different cases.

Many patients have an attack of coma or somnolency, from which it is impossible to rouse them. Several such seizures may recur within a short period; or with the senses apparently intact, and the intelligence in some degree remaining, the power of utterance is suspended, and not a syllable can be formed on the lips.

The palsied extremities are variously affected; they are often extremely painful—sometimes they are moved convulsively—at others kept in a state of tonic spasm, by the action of the flexor muscles, the limbs remaining permanently contracted.

In other cases the patient sinks gradually into coma; emaciation proceeds rapidly; the pulse is quick, and sometimes intermitting; the tongue is parched and encrusted in the centre; the teeth and gums are covered with sordes; a film forms on the conjunctivæ; the eye-lids are glued together; bronchial râles are heard within the chest; the cerebral functions are suspended; deglutition is impossible; the evacuations are passed unconsciously; and the patient dies in the most profound insensibility.

Apoplectic Softening.—The most remarkable variety of the disease is that which from the manner of attack is named apoplectic. Comatose seizures are common to all its forms; but, sometimes the case assumes all the characters of sanguineous apoplexy.

Almost invariably however, precursory symptoms of some kind precede these attacks; such as headache; failure of the intelligence; inaptitude of expression; pains and weakness of limbs, or other marks of cerebral disturbance. But these warnings might have been extremely indistinct, when the comatose attack appears.

Ataxic.—This form is characterised by extreme depression of the vital powers, either in consequence of previous disease, or from original weakness of constitution. There is, besides, a cause difficult to explain, which induces this low form of the complaint, in patients of robust habit, who are rapidly brought by it into the greatest prostration. The disorder may commence as usual, and produce the ordinary effects on the cerebral functions. Its peculiar feature is the rapidity with which typhoid symptoms come on.

A group of symptoms detailed in the following case has occasionally come under my notice, which in many respects resembles those of cerebral softening. A man aged 55, who formerly held a situation of trust, which he lost by bad conduct, was consequently reduced to great poverty. He soon became utterly desponding; the mind was in some measure enfeebled, and the temper soured. By degrees he fell into a perfectly apathetic state, and became entirely indifferent to his personal wants and comforts, passing nearly his whole time in sleep. From this torpor he could be roused with little difficulty; but his replies to questions were not always coherent, more, apparently, from the desire of avoiding the trouble of thinking, than from actual incapacity. He evinced the same total indifference about his food and drink, and it was difficult to rouse him sufficiently to take the necessary nourishment. At times, however, he would eat eagerly and greedily. The tongue was clean; the respiration natural; the pulse regular, of moderate strength; the urine free from albumen; the bowels were very obstinate; the head and face were bathed continually in a profuse sweat.

In this state he continued for more than a month, the prostration gradually increasing both of mind and body. A few days before death an universal bronchorrhœa came on, during which he sunk into deep coma.

A form of acute softening of great interest is that supervening upon meningeal inflammation, in which the signs peculiar to each condition are successively displayed. A similar course is sometimes observed in delirium tremens, when the brain has been deeply injured by repeated attacks. There appears, as it were, a struggle between the old disease and the new; the delirium, noisy excitement, and delusion, giving place to prostration, debility, and coma. I lately saw a case with Mr. Noyce, in which this course was followed very distinctly. The patient, a lady aged 33, had undergone several attacks of delirium and delusion, by which her memory had been seriously impaired. Another return of her malady came on in the usual manner, with restlessness and excitement; but, on the following day, these symptoms disappeared, and she fell into insensibility and somnolency, in which she remained for several hours. While in this state, no efforts could rouse her; but, at night, consciousness was in some measure restored. This course was repeated several times. In the intervals of the seizures, some symptoms of her former disorder returned. She fancied herself surrounded by strangers to whom she addressed her conversation, and she made attempts to remove animals that she imagined were crawling on the bed clothes.

It was now observed that she was partially hemiplegic on the right side. The pulse was 60—the skin cool; the debility very great; the emaciation went on rapidly; the urine was passed in bed; the bowels were constipated.

In this manner the symptoms continued for four or five days, the wasting and prostration still increasing. A mucous râle was now heard which soon spread over the chest. The pulse became small and very quick; the face was flushed; the skin hot, and occasionally covered with a clammy sweat; the eye-lids were glued together by mucus; that of the right side was apparently palsied; the pupils were greatly and permanently contracted. She died comatose.

Chronic Softening.—The chronic is not usually the result of acute softening, but its symptoms approach gradually and sometimes almost imperceptibly; it is most common in aged persons. Before the patient makes any complaint the danger may be perceptible to others, in his altered manner and failing intellect. The headache is seldom very severe or distressing in this form, neither is the nausea or vomiting. But the faculties become clouded; the memory fails; the speech is slow, hesitating and incongruous. Familiar names cannot be uttered, familiar objects are scrutinized as novel and strange. The expression of the countenance undergoes a visible change, and is strongly indicative of imbecility and stupor. Palsy may attack one side of the body, the affected limbs being often painful or convulsed, or rigidly contracted.

The progress of these chronic cases is, however, often marked by a series of attacks in which the palsy is more complete, the mental faculties suspended, the speech entirely lost, and sometimes sensation and voluntary motion temporarily annihilated. From this state the patient will emerge, and regain a certain amount of intelligence and muscular power. Death may, however, overtake him in one of these seizures: or it may come on more gradually in consequence of the increasing debility, or by the supervention of an adynamic state.

Latent Softening.—The brain is sometimes found softened after death to a considerable extent, when there had been no symptoms whatever of cerebral disturbance. The simplest explanation of this occurrence would be, that the appearance was but the result of commencing decomposition; and in some instances, it would doubtless be also, the true one. But, there is another circumstance, too important to be overlooked in this question, which suggests that it cannot always be so readily disposed of; there are, for example, on record, cases of fatal apoplectic seizures, not preceded by cerebral disturbance of any kind, where the only morbid appearance to account for death was softening of the brain. The disease must therefore have existed for a period, and caused no symptoms.

There is no proof that in instances of this kind the disorder advances very tardily, and that the symptoms are in consequence imperfectly developed. On the contrary, it can sometimes be referred to an evident exciting cause when the disorganization appears to to have been speedily effected. When the brain has suffered temporarily from mental or physical shock, but has apparently recovered, the fatal attack may suddenly come on. It is difficult to understand how the disease can advance thus silently, to a point that is incompatible with the continuance of life. It may be, that some portions of the diseased mass remain sound until the moment of the seizure; for it is not unusual to find a few healthy fibres stretching across the softened structure; or the shock to the encephalon in which the disease originated might have rendered it in some degree insensible to irritations.

Instances of this kind are, however, far from common; I have often met with cases where the attacks were stated to have been without warning; but I have never failed to discover that this assertion required modifying; and that the patients had experienced brain-symptoms, although not of a kind to cause any considerable annoyance.

Symptoms. — Before advancing further into the history of the disease, it might help to a clearer apprehension of its nature and characters to pass in review each of its leading symptoms. In this examination the chief trust must be in the analysis of cases, the nature of which has been attested by a post-mortem inspection; and, even then, some caution will be requisite; for the texture of the brain often breaks down in consequence of previous disease of the organ, or its membranes; and there is therefore some difficulty in determining the signs that mark the commencement of the secondary affection.

Intelligence.—The mind is almost invariably impaired in some degree in confirmed softening. The form of aberration is characterized by feebleness of the intellectual faculties, slowness of apprehension, or imbecility. Wild and noisy excitement, or delirium, is rarely observed, except in the first stage of acute softening, especially of the convolutions. But even then this symptom is transient only, soon giving place to the form of mental failing which belongs to the disease. So generally is this found, that the continuance of delirious excitement would warrant a pretty confident opinion, that the brain-structure is still sound; but, when these ravings begin to subside, and they are replaced by heaviness, somnolency, imbecility, or stupor, and these symptoms coincide with others denoting disease localised in some portion of the brain, it is all but certain, that softening has already taken place.

It often happens that the first circumstance that calls attention to the patient's state, and awakens the apprehensions of his friends, is some symptom of this kind. There is unwonted slowness of comprehension; failure of memory in regard to familiar names and circumstances, and incapacity for the common routine duties of life. The progress of the disorder is frequently marked by the gradual deepening of the mental torpor, until perfect imbecility is established. But the destruction of the intellect does not in general advance in this uniform manner; the tenor of this course is interrupted by accessions of more determined oppression in which the higher cerebral functions are sometimes completely suspended.

These attacks, whether of lethargy, somnolency, or coma, form so important and characteristic a feature of cerebral softening, that it might be proper to glance at the various modes of their occurrence. In acute cases a seizure of this kind may come on very early in the disease, and terminate fatally. A patient at the Bloomsbury Dispensary, aged 70, had suffered occasionally from giddiness, but he continued to attend to his business. He was attacked suddenly with coma and right hemiplegia, and in this state of total insensibility he remained until he died. The only lesion found in the brain was softening of the left corpus striatum and optic thalamus.

But, the general character of these invasions is, that they are transient and frequently repeated. In chronic softening the case may go on in this manner for months or years, paroxysms of insensibility or coma returning at intervals during the whole period. It is remarkable, that the intelligence in these patients undergoes less permanent injury, than in that form of the disease not marked by such accessions; and, at times, the mind may be sufficiently bouyant to permit the patient to attend to his usual avocations. It may be observed, too, that when he had been for some time previously in a state nearly approaching imbecility or somnolency, the attack will frequently remove a great portion of the oppression and be followed by a sense of relief and greater firmness in the exercise of the intellect.

Another circumstance observed in these seizures, and highly indicative of cerebral softening is the rapid—almost the abrupt manner in which consciousness is restored. At one hour, the patient is labouring under the symptoms of deep apoplexy—and at the next, he is found with his memory and judgment in a great measure regained, and even sitting up and conversing cheerfully.

The cause of these comatose seizures would probably be explained differently according to the opinion entertained of the pathology of cerebral softening.

The frequent repetition of the paroxysms, their sudden accession and abrupt termination, the inutility of depleting remedies, have some alliance with the epileptic seizure, but, in other respects, this similitude is not maintained; for the convulsive strugglings, foaming at the mouth, spasm of the jaws or neck, biting the tongue, which commonly mark the epileptic fit, seldom attend that dependent on softening of the brain.

The immediate cause of the paroxysm in these cases has sometimes been referred to congestion of the brain or its membranes; but, although in some cases where death takes place in the attack, the cerebral vessels are evidently loaded; in others no such appearance is presented. Neither do the symptoms correspond with this theory, and it might be a serious error to treat the case in accordance with it: in many instances the death-like pallor, the thready pulse, the suddenness and frequency of the attacks, and their rapid termination, are entirely opposed to the notion of vascular fulness.

Others suppose that these accessions interrupting the usual progress of the disorder, denote the supervention of acute softening. To this notion, also, it is impossible to give a general assent, for neither the post-mortem appearance nor the symptoms warrant it. Opposed to this view are still the transient character of the attacks, their sudden accession and disappearance, their rapid succession with intervals of consciousness, and their subsidence without the employment of active treatment.

The important suggestion of Dr. Todd in the explanation of convulsive or epileptic paroxysms,—

that they depend upon the presence of some irritating matter in the blood, might be applicable to some of these cases. The existence of a morbid element of this kind might readily be admitted to occasion derangement in the functions of an organ already in a diseased condition, and the attacks are sometimes clearly traceable to acrid ingesta, which might have caused a vitiated state of the circulating fluid. But, in general, no such origin can be suspected, for the paroxysms come on without any appreciable change in the habits or diet. Occasionally, they are induced by mental disturbance or shock; but they often appear without obvious cause of any kind, and can only be regarded as phenomena appertaining to the disease itself.

The pathological condition that Dr. Marshall Hall has shewn to be the immediate cause of some paroxysmal affections, does not, I believe, exist in these attacks. There is, in general, nothing in the symptoms which suggests spasm of the muscles of the neck exercising compressiom on the cervical vessels, and thus inducing congestion of the brain. Indeed, the seizures are chiefly characterised by the absence of spasm and convulsive struggling, and are apparently more associated with a passive than an active condition.

However inconclusive it may appear, it seems better for the present to refer these attacks to some unknown change in the cerebral texture itself, than to any circumstance in its condition that cannot be proved to exist. The symptoms do not well correspond with the notion either of compression of the brain, or that it is stimulated into inordinate activity by the action of an irritant; they rather indicate suspension of function in some portion of the organ, or palsy of its communicating fibres.

There is a species of mental imbecility sometimes accompanying cerebral softening, which is manifested chiefly in the manner and actions, and on that account is called by the French physicians *deliré d'action.* These patients are generally aged persons; they are occupied continually with some employment without motive, almost without consciousness, and are generally very restless and irritable. They dress and undress frequently in the day, busy themselves in unmeaning preparations, and continually repeat the same act, forgetting its previous performance. From this state they generally pass into more determined dementia, in which the mind is hopelessly clouded, the expression vacant and idiotic, while, at the same time, the extremities are paralytic.

Although it seldom happens that cerebral softening passes through its whole course without occasioning some degree at least of intellectual weakness, yet this is sometimes observed. It might be expected that an analysis of these cases might aid in determining the functions of the regions of the brain, and point especially to the portions subservient to mental manifestations. Bouillaud imagines that the intellects are preserved so long as the disease is confined to one cerebral hemisphere, unless when the opposite side of the organ is compressed from swelling in the seat of the lesion. It would be needless now to detail examples of failure of the intelligence when the disease was strictly limited to one hemisphere, and unaccompanied by swelling.

The symptoms of mental weakness or disturbance might be supposed to indicate disease of the convolutions which physiologists consider to be the special seat of the higher faculties. The following summary will shew how far this point may be relied on in the diagnosis of cerebral disease. In 25 cases where the softening was confined to the central parts of the brain, and where there was no vascularity, adhesion or other complication, which might be supposed to affect the surface of the organ, the intelligence was greatly impaired in all but 4. There was, however, no uniformity in the character of the disease in the instances where these signs were either present or absent, in regard to seat, extent, mode of approach, or otherwise.

In 18 cases wheret he cortical portion was affected, there were marked mental symptoms in 14, and in the remaining 4 the intelligence was slightly injured. These examples are not advanced as affording even an approximation to the comparative frequency of these symptoms in the diseases of the cerebral regions; but, merely to prove that it is not possible to decide positively on the seat of the disorder from the existence or absence of this class of signs.

Speech.—The symptoms connected with the functions of speech and articulation form a most remarkable group in this disorder. These are presented in several forms, which, although possessing a general resemblance, are probably dependent upon very different pathological conditions.

1. There may be an entire deprivation of speech; the patient is struck dumb; he cannot utter a single syllable; and in his attempts to articulate, only confused moanings are produced; or even this is sometimes beyond his power, and not an intonation can be elicited. This symptom is not merely the consequence of failure of the memory or of the intelligence, for the patient is in general eager to shew that he understands well enough the meaning of language addressed to him, although he can make no reply. Neither is there any defect in the organs employed in the mechanism of speech; the tongue can be protruded freely, and it is perfectly flexible; and the other muscles that assist in modulating the voice seem fully capable of their functions, that part of the process being apparently defective by which the mandates of the will are conveyed to the organs of articulation. Patients in coming out of this state say, that they had a perfect apprehension of the idea that they wished to express, and of the words suitable to the purpose; but, that some uncontrollable feeling prevented them from giving utterance to their thoughts. Indeed, this is obviously true in some instances, for they are able to express their feelings and wishes by writing in perfectly correct language. It is curious, that while the will has complete control over the movements of the organs of speech in most actions, it should be suspended in those by which the modulation of the voice is effected. This symptom is seldom of long duration, but, like the coma dependent upon cerebral softening, it may come on suddenly and disappear abruptly. It will often follow mental agitation or

alarm. In some patients the power of speaking is lost when they are addressed unexpectedly by a stranger; and some minutes usually elapse before the function is restored.

A medical friend was accustomed to employ a poor man, who subsequently died of cerebral softening, in conveying parcels and messages. When a door was first opened to him he was often unable to utter any intelligible sound, but after waiting a few minutes he could speak with sufficient distinctness.

A woman who died a few months ago with chronic softening was often attacked in this manner. On one occasion, a person called upon her when she was in this state; being unable to give the usual words of welcome or to make any audible reply, the matter was misconstrued and gave great offence.

The condition of the brain giving rise to this curious symptom, is uncertain. Under the circumstances now alluded to where the deprivation is not occasioned by a failure of intelligence, it certainly is most frequently observed in the early stages of softening. In some respects the refusal of the muscular system to obey the dictates of the will, whilst consciousness remains, seems to bear some analogy to a form of catalepsy.

2. The speech is often affected in a different manner. It becomes hesitating and drawling, not owing to any defect in the memory of words, or from a physical difficulty of utterance; for the language employed is pertinent to the occasion, and the articulation clear.

This symptom is mostly associated with considerable mental torpor and an expression of fatuity; and probably, the slowness in bringing out the words may be the consequence of a similar tardiness in the process of thinking, the ideas presenting themselves sluggishly. When this drawling speech is fully confirmed, it is generally permanent in some degree, although it is much more apparent sometimes than at others.

3. The speech may be slow and hesitating in consequence of a loss of the memory of words. The expression sought for cannot be brought to mind; the person speaking much in the manner of one who attempts to converse in a language not familiar to him. He makes use of terms that do not express his meaning, sometimes with a consciousness of the mistake and painfully annoyed at it; but in other instances, without being in the least aware of it. Some of my patients, who were affected in this manner, and who recovered sufficiently to explain the nature of their embarrassment, stated that the right words were for the moment suggested to the mind, but before they could be pronounced, they had vanished from the memory; but, in many such cases, there is evidently a want of power in the discrimination of words and sentences, which are consequently devoid of congruity or meaning.

4. A modification of this symptom, still more remarkable, consists in the entire misapplication of words and sentences, although the patient is aware that he is talking wide of the subject. He is governed by an impulse beyond his control to use a certain set of words and those only; and in his attempts to speak, the same phrase invariably escapes from his lips; or,

when the general conversation is correct, some word or expression is forced incongruously into employment, and substituted for others which the patient is desirous to use. As examples of this occurrence I may allude to some cases of this kind that came under my notice. One man who had symptoms of softening could only utter the words "what is the matter," and this phrase he continued to repeat for several days in answer to all questions addressed to him. This man partially recovered, and could recollect that he felt compelled to employ the same phrase although vexed and mortified that he did so. Another patient was very vociferous in his demands for "tea," but when it was brought to him he refused it indignantly, continuing, however, to repeat the same word incessantly. His friends considering that his taste for this beverage had become unwontedly fastidious, endeavoured to gratify it by seeking for the best gunpowder tea, but all with the same effect. At last, it was discovered that when he asked for tea, he meant wine.

Cruveilhier says that a woman formerly at the Salpietriere never spoke any word except l'Eté ; she consequently was known in the wards as Madame L'Eté.

Itard and others have remarked that the memory of words is lost in a certain definite order. Proper names are first forgotten ; then other substantives ; afterwards verbs ; and lastly, adjectives.

This observation I have found to be generally correct, so far at least as it refers to nouns, whether proper or common. It is remarkable, that this defect of the recollection in regard to persons and things may not extend to circumstances connected with them. Thus, although the name of an individual cannot be called to mind, his features can be correctly described; and the shape and uses of objects are understood when their titles are forgotten. I have now a patient who can give a correct description of his master's person, whose name he cannot by any means recal; but he recognises it immediately when pronounced by others.

The pathology of these symptoms connected with speech is in much obscurity. It may consist in some instances simply in a failure of memory, but in others, there is something beyond this, and more difficult of explanation. In those cases, for example, where there is an unconquerable impulse to utter words and phrases without object or purpose, the symptoms must have a very different origin; there appears to be an evident alliance between this affection and that form of insanity where the patient is driven, imperiously and in spite of his better judgment, to the commission of some act of violence or absurdity.

Bouillaud and other pathologists are of opinion that this class of symptoms, where the speech is in some way implicated, depends upon disease of the anterior lobes of the brain, and adduce many facts in support of this view. But this theory fails in its application upon a wider view, and there is probably no portion of the brain where disease may not produce some modification of this symptom; the result is not simply a defect of language or speech, but of some of the mental functions to which language is subservient; for there is in many instances something beyond this kind of deficiency; a more complicated pathology, and one more concealed. Loss of speech in these cases is seldom unaccompanied by other symptoms of cerebral oppression. Andral, however, mentions one instance where it existed alone, when the disease was found not in the anterior lobes, but in both hemispheres of the brain.

The symptoms now alluded to are strongly indicative of cerebral softening; at least, they seem to be more frequently dependent on that condition than upon all other cerebral affections united; and when observed with other concurrent signs, they assist materially to a confident diagnosis.*

*Voluntary **Motion**.*—The function of voluntary motion is almost invariably impaired in this affection. There may be palsy of one or more limbs; or the flexor muscles are in a state of forced contraction; or, the extremities are subjected to convulsive movements.

1. Paralysis is one of the most constant attendants on cerebral softening. Its approach is often gradual; some degree of weakness or rigidity, or an alteration in the sensation of the limbs, being first observed. It may go on increasing in this measured manner; or a seizure occurs, accompanied generally with stupor, in which complete hemiplegia is established.

But, the palsy often appears quite suddenly. Either there is an apoplectic attack which leaves the patient hemiplegic, or he is struck with palsy without preceding coma. This accident sometimes happens in sleep;

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* For some excellent remarks on the Physiology and Pathology of the Voice and Speech, see Bishop, on Articulate Sounds, &c.

in the morning it is found that voluntary motion is lost in one or both limbs.

The palsy may be confined to either extremity; but, this appears to be a rare occurrence in cerebral softening of long duration. In general, both limbs of the same side are implicated, although one may be affected previously, and to a greater extent than the other. When an improvement takes place, it is found, as in hemiplegia from other causes, that the leg first regains power; for the palsy from softening of the nervous centre sometimes subsides, at least when the invasion had been sudden. There is an apparent difficulty in the circumstance, that a condition occasioned by a permanent lesion should be capable of removal. The explanation is probably that suggested on speaking of the comatose attacks incident to this disease—that the brain is subjected to some temporary oppression, under which its functions are seriously impaired, the symptoms again improving with the cessation of this action.

When, as occasionally happens, the disease is unaccompanied with hemiplegia, an opportunity is apparently afforded of determining the seat of motive power in the central organ. But an analysis of cases where lesion of the motor function was either present or absent, gives no uniform result. In four of Andral's cases without palsy, the softening was found in very different parts of the brain. In one, it was confined to the convolutions of the convexity; in another, one of the anterior lobes was affected; in two instances there was disease at several points of the cerebral hemispheres.

When the corpus callosum is diseased to any extent, paralysis of movement appears to be invariably induced. I have not been able to find a single well-marked exception to this law, which is one of great interest in the pathology of the brain.

2. There is a peculiar condition of the motor organs occasionally seen in the earlier stages of chronic softening, in which the limbs have not only diminished muscular power, but they are likewise stiff and painful. The symptoms, in many respects, resemble chronic rheumatism, but, the weakness and rigidity are principally limited to the limbs of one side taking the hemiplegic form; the pain also, has a thrilling character, and is accompanied by a sensation of numbness. The manner and address, the vacant expression, the slow drawling speech and fading memory which accompany this state, are strongly suggestive of cerebral disease; and this apprehension is usually confirmed by the affected limbs becoming subsequently palsied.

3. But the most remarkable symptom connected with the organs of voluntary motion, is that tonic contraction of the flexor muscles termed contracture or spastic rigidity.

In an extreme degree of this action, the muscles of the extremities are kept in a state of rigid spasm, and the exercise of the will over them is entirely suspended; nor can the limb be straightened by any amount of force, short of that which would rupture the muscles. Even the attempt occasions much suffering; for the parts when in this condition are generally morbidly sensitive, and are frequently attacked with paroxysms of severe pain.

Various degrees of spastic rigidity may exist; sometimes it affects the fingers and toes only, which are strongly and permanently contracted; but, at others, the whole limb or both extremities of one side are involved in this action. So powerful is the spasm that the limb is forced by the muscular contraction into flexure more complete than could be reached by the healthy action of the most powerful muscles. The fore-arm is thus bent forcibly on the arm, and the humerus kept in a similar constrained position. The lower extremity may be equally affected; the toes are incurvated towards the sole of the foot, the latter bent towards the shin, while the leg is forced backwards until the heel approaches the nates, the thigh being drawn towards the abdomen.

The spasm may continue without any attempt at relaxation for a very considerable period, and until the limb is completely fixed in this constrained posture, remaining so even after death. In many cases, however, it is less persistent; and sometimes it will give way and be again renewed several times in the progress of the cerebral disease.

The pathology of this remarkable symptom is still but imperfectly understood. Some imagine it to arise from meningeal irritation; others, that it denotes a morbid state of the membrane lining the ventricles; Gendrin regards it as the consequence of inflammation surrounding apoplectic effusions; Rostan, as announcing the commencement of cerebral softening. Andral also believes that contracture is one of the least equivocal signs of that lesion.

That the latter view is correct, is rendered probable by the following abstract of 32 cases, in which spastic rigidly existed. In 29 of these there was cerebral softening; in 2 old adhesions of the membranes; in 1 congestion of the brain and meningitis.

This statement is strongly corroborative of the opinion that contracture is symptomatic of softening of the brain in a large proportion of cases; but even taking this for granted, there still remain many circumstances in regard to it that require explanation.

It will be necessary to bear in mind, for example, that contracture is not indicative of softening in any single region of the brain, but it appears to be an occasional attendant of the disease in all parts of the organ. It is often absent when other signs of softening are unequivocally presented. Neither can it be said to be strictly pathognomonic of the disease, for although softening is its most common cause, there are several other cerebral irritations capable of producing it. There is evidently, therefore, some other element to be discovered in this pathology, besides the alteration in the texture of the brain.

The researches of Dr. Marshall Hall have established the important position that the state of tonic spasm can only be maintained through the agency of the spinal system. When an animal is thrown into this state by a poisonous dose of strychnine or opium, the contracture will remain after the division of the spinal marrow, and even after decapitation; but, at the moment when the spinal medulla is removed, the limbs are completely relaxed.*

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* Some years ago I had an opportunity of witnessing the repetition of these experiments with the view of deciding the nature

The occurrence of contracture must, therefore, be supposed to announce that the morbid action going on within the brain has in some way spread to the spine. The ordinary course of reflex actions seems however inapplicable in these cases; nor can, I think, the symptom be satisfactorily explained by any modification of the muscular irritability in the affected limbs. The symptom would rather indicate some active process going on at the seat of the disease. Contracture would be likely to occur when irritation is transmitted from the brain to the medulla oblongata; it would cease when that irritation is suspended. The opinion of Rostan that it is a sign chiefly belonging to the commencement of the disease, is therefore well founded; for it could occur only when some of the fibres of communication between the brain and spinal marrow remained entire. It is common, too, to find the rigidity give way when the cerebral functions are profoundly implicated, as for instance in comatose seizures; it will again re-appear when the effects of the shock begin to subside; it seems also to be occasioned by the local action accompanying a curative process in brain lesions. Gendrin was probably correct in ascribing it to the

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of contracture, when the result was as it is now described. One circumstance, noted at the time, might be worth recording, as shewing very strikingly, the agency of the afferent nerves in promoting reflex actions. A decapitated frog, which was supposed to be quite dead, was placed into a bason of water: the moment the surface of the body came in contact with the fluid, the limbs were thrown into energetic action, which continued for several seconds. In this manner the stimulus of their natural element probably lends to aquatic animals material aid in progression.

inflammation surrounding an apoplectic clot, although this is but one mode of its origin.

This kind of action will, I think, be found applicable to some other symptoms attendant on affections of the brain.

The organs of voluntary motion are observed occasionally to be affected in other ways in the progress of cerebral softening.

4. Sometimes, a convulsive or epileptic paroxysm attacks the patient, in which either the palsied or sound side is violently agitated, or the convulsions may be general. But this kind of seizure is by no means usual, except perhaps at the beginning of acute cerebral softening. The well-known experiments of Flourens have determined the fact, that convulsions are not occasioned by lesions of the brain, but by those of the spinal marrow; their occurrence, therefore, in cerebral softening shews that the irritation is conveyed to the spine.

5. The limbs are in some cases of chronic softening attacked with convulsive tremblings. Many patients suffer in this manner; one extremity, especially the arm, being agitated continually with a tremulous motion, which is immediately increased by mental agitation. The limb is at the same time partially palsied, and subsequently the leg of the same side becomes also implicated, and complete hemiplegia is established.

6. There is another very curious symptom belonging to this class, that seems to occupy a middle station between convulsion and contracture; which consists of a series of automatic movements frequently

repeated, and entirely beyond the control of the will. Rostan observed in one of his patients that the hand was opened and closed alternately. Lallemand had a patient whose left arm and hand were continually agitated with movements of flexion and extension, until the limb became palsied.

A lady whom I saw with Mr. Bryant, of Lambeth, had this symptom. She was apparently recovering from hemiplegia when another seizure took place, in which the left side was completely palsied. The right arm was raised every two or three minutes, and the hand carried by a loose disjointed kind of motion to the head; then, the muscles suddenly relaxing, the arm fell to the side. These movements came on in paroxysms, which lasted for one or two hours.

Sensation.—Some perversion of sensation is often among the earliest signs of this malady. Annoying feelings of various kinds are experienced; such as heat or cold, or tingling or pricking sensations. When these morbid feelings take the hemiplegic form, and persist in the same limb, the case should be thoroughly sifted, for they are expressive of danger. Their significance is greatly enhanced, when they are accompanied by headache, confused thought, vertigo, or other signs of cerebral disturbance.

Anæsthesia of the palsied limbs seldom exists until paralysis of motion is far advanced. It has been supposed to be more distinctive of softening than of cerebral hæmorrhage; but, the grounds for this opinion are not very clear. When the seizure is sudden, the cutaneous sensibility may, for a time, be completely lost on the palsied side, either over its whole surface or in some parts only; but the anæsthesia is usually much less persistent than the loss of voluntary motion, and in the majority of instances the sensation is retained.

The skin or muscles of the affected side are sometimes excessively sensitive, so that the least touch or movement causes exquisite suffering. Even when the surface is perfectly insensible, the deeper seated structures may be extremely painful; and any attempt to change the position of the limb excites great torture, the symptoms bearing a close resemblance to rheumatism. In other instances, neuralgic pains shoot through the palsied limbs at intervals, the paroxysms often observing a regular type. These opposite conditions of the functions of sensation and voluntary motion in the same organ are very curious, the cerebral lesion occasioning loss of one and exaltation of the other.

The cause of these several variations in regard to the function of sensation in cerebral softening is still obscure. "We have sought," says Andral, "the cause of this difference in the seat of the disease, and have not found it; nor have we discovered it, either in the extent or character of the lesion."

When derangement of sensation attends these cases, the disease is not always found in that portion of the brain that is supposed to administer to that function; nor, on the other hand, when that region of the cerebral substance is diseased, is there always a lesion of sensation.

In 18 cases where the optic thalamus was softened, there was some symptom connected with perverted sensation in 11; in 5 this function was not affected; in 2 the fact could not be ascertained, from the presence of coma.

In 20 cases where the sensibility of the palsied limb was injured, the softening was either in the convolutions or near the surface of the brain in 15; in the walls of the lateral ventricle in 2; near the optic thalamus in 3.

The acute suffering of the palsied limbs does not however necessarily imply that the lesion is in the sensory tract, any more than contracture or convulsions are expressive of disease seated in the medulla oblongata; but the pain may be occasioned by the spread of the irritation from some other portion of the brain to that in which sensation originates.

Headache.—This is a sign of considerable importance in the diagnosis of cerebral softening, generally accompanying its early stages, and sometimes continuing to the end.

Severe headache is found sometimes to have preceded the more distinctive signs of the disease for several months, or even for a longer period. But in these instances it is probably referrable to a chronic meningitis, or some other morbid irritation previously existing within the cranium. This symptom is however among the earliest and most generally present in this disease. It is often complained of for several days in acute softening before the other signs assume much importance.

The character of the pain is not usually acute, but occasionally it is shooting and lancinating like that of neuralgia. The nature of the malady might therefore be overlooked, especially as the headache comes on in paroxysms, sometimes even with distinct intermissions. A careful examination will even under these circumstances detect the lurking evil; obtuseness of intellect, or delirium, or some feeling of weakness or tingling in the limbs, an anxious expression of countenance, or other sign will be observed.

The headache is often more characterised by oppression than actual suffering, and is attended by an indescribable feeling of apprehension and alarm. In many instances there is nothing beyond a sensation of weight or discomfort in the head, which, nevertheless, is very distressing.

The pain may be fixed in any part of the head, or it may involve nearly the whole organ, or be variable and uncertain as to its seat. Its most common situations are the forehead and sides of the head. In many cases, it occupies the spot corresponding with the cerebral disease; and indeed, a fixed obtuse pain over one of the parietal regions, with some lesion of sensation or movement in the opposite limbs, are symptoms strongly indicative of cerebral softening.

Headache is not usually an enduring torment in these cases; it belongs more to the commencement of the softening process than to its completion; and old paralytic patients who had formerly suffered from it, are relieved from this trouble in the advanced stage of their disorder. The pain, however, is liable to renewal, whenever the disease assumes fresh activity, or under accessions of cerebral oppression, however induced. In the comatose attacks incident to this affection, the hand is often carried to the head as if it were painful; and when the patient is sufficiently conscious to understand questions addressed to him, he will sometimes point to his head if asked where he suffers.

Special Senses.—The organs of sense are less affected than might be expected. Amaurosis is not uncommon, generally of one eye only; sometimes of that which corresponds with the palsied side; more frequently according to my experience, of the opposite eye. The indistinctness of vision is in some instances preceded by spectral appearances. Others say that objects appear to them of a red colour like blood. Fuchs speaks of flashes of light, or black specks before the eyes as indicating softening; but these signs cannot be regarded as distinctive, or indeed as of frequent occurrence in this lesion. Neither is distortion of the eyes, squinting, or palsy of the muscles of the eyelids often observed, except in the comatose seizures that mark its final stage.

The state of the pupils has also been supposed to furnish the means of diagnosis. Thus, Lallemand thinks that their contraction indicates softening, their dilatation, apoplexy. Dr. Craigie* suggests that the rigid closure of the pupils depends upon a similar cause to that inducing contracture of the limbs, and Lallemand found these two signs frequently coincident, and that when the contracture gave way, the pupils at the same time became dilated. It may be true that these two symptoms depend upon the same kind of irritation, but they are certainly often found disunited; Durand-Fardel has taken pains to prove, by numerical references, that the state of the pupil gives no certain aid in the diagnosis of softening and apoplexy.

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* Practice of Physic, vol. 2nd, 1840.

The hearing is less frequently injured than the sight. Deafness of one or both ears may come on in the progress of the case; but it is not common even in confirmed softening. Some complain of noises in the ear, either continual or frequently recurring. This, when it occurs at all, is an early symptom, and seems to belong to a state of the brain that precedes the alteration of structure rather than to the actual disease. Noise in the ear may, however, arise from so many circumstances, that unless accompanied with other signs of cerebral disease, it is of no great significance.

I have never met with an instance where the senses of taste and smell were lost in the initiatory stage. In the confirmed disease, when the perceptions are blunted, and there is almost a total indifference to all things, those functions become implicated in the general ruin.

Digestive Organs.—The digestive functions are sometimes impaired in the first stage of acute softening; but in the chronic variety it is not usual to observe any such derangement. In the acute disease, nausea and vomiting are often distressing symptoms accompanying vertigo and headache. But this morbid sympathy between the brain and stomach is not sustained in the advanced periods of the disorder, and the vomiting ceases entirely when the other symptoms become more confirmed. In old cases, the appetite is often good, sometimes voracious; the tongue clean, and the digestion healthy. The bowels, however, are mostly constipated in all forms of the disorder.

In the last days of the disease, the abdomen is often swollen and tympanitic, and the discharges frequent and watery.

Deglutition is seldom impaired unless in the last hours of life; but I have twice had patients in whom there was an insane desire to cram substances into the mouth, without attempting to swallow them, to such an extent that, in one instance, suffocation was threatened by the accumulation of the matters in the fauces.

There was a general agreement in most points of the history of these cases. Both patients were boys about twelve years of age, who were attacked with acute meningitis followed by the symptoms of effusion, and it was with the latter that the tendency now alluded to came on. The ravenous feeling was evidently not produced by hunger; for the bed-clothes, books, and other non-edible matters were likewise thrust into the mouth with the utmost avidity, and there was a disposition to bite persons. Both patients were in a semi-conscious state approaching to somnolency. One died by the sudden supervention of deep coma; the other, in a convulsive paroxysm.

The membranes of the brain were much injected; a large quantity of serum had collected in the ventricles and at the base. In one patient, the fornix and septum lucidum were reduced to a pulpy consistence; in the other, there was softening of the nervous tissue from the level of the right lateral ventricle to the base.

To which of the morbid states of the brain in these cases the symptoms alluded to should be referred, it is difficult to determine; but it is not improbable that the softening, which in both instances was of the parts near the base, might have aided in producing them.

Urine.—The urine in the early stages of softening is commonly scanty and high-colored, and loaded with the lithates.

In chronic softening it is almost invariably pale and clear, and neutral, or even alkaline, restoring the color of litmus paper previously reddened.

The urine in the oppressed state of the brain is passed with difficulty so that the catheter may be required. In the comatose seizures, or in the typhoid state which often terminates the case, it is generally voided unconsciously.

Respiration.—In the apoplectic variety of softening the breathing is affected precisely as in cerebral hæmorrhage, being in many cases slow, heaving, and stertorous.

In the early stages of the complaint there is no embarrassed breathing, but towards its conclusion the lungs commonly suffer; and a considerable proportion of these patients die from asphyxia. It seems to be a general law in cerebral affections, that while the sympathy between the brain and stomach, which is so intimate in the healthy state, is destroyed by organic disease in the former, that between the brain and the respiratory organs is augmented by the same process.

That peculiarity in the respiratory movements, one side of the chest expanding sooner and more completely than the other, which Serres believes to be indicative of cerebral disease, I have not noticed in this affection, except perhaps in the attacks of coma. With the signs of softening such a want of symmetry in the motion of the chest might have a still more important signification, and its cause should be instantly discovered; for intercurrent pneumonia, or bronchitis, is common towards the termination of the disease, and the pectoral complication is often established very insidiously. Andral found in some of his patients that the breathing became suddenly urgent. Râles were heard over the whole of the chest, and death from asphyxia soon followed, although a few hours previously the lungs were free from morbid sound of any kind. Cruveilhier also observes that many of these patients die of pneumonia.

The circumstances in relation to the brain which excite this pulmonary complication are not known; nor does it appear to be exclusively associated with the disorders of any particular region. A circumstance which seems generally to prevail in this sympathetic connexion is, that when the pneumonia is confined to one lung, it is mostly in that opposite to the cerebral hemisphere where the substance is destroyed.

Circulation.—The pulse as a general rule is not much accelerated in this disease. Lallemand, Bouillaud, and others who regard it as almost essentially inflammatory, admit this fact. At the beginning of the attack, however, in acute cases, there is frequently some degree of febrile action which may continue for a short period; but this soon subsides, and the pulse afterwards is often slower than in health. A certain labouring character of the pulsations, which are unequal in force as well as rhythm, is very commonly observed in the oppressed condition of the brain; and when this is not perceptible at the wrist, it is generally quite obvious with the movements of the heart. Instead of the second sound that accompanies this action following immediately after the first, as in the healthy state, the interval is considerably prolonged. This alteration of the rhythm is often indicative of an oppressed brain; it will disappear under treatment, the two sounds approximating more nearly in proportion as the organ is relieved; and even in cerebral softening it is often more marked when the symptoms undergo a temporary aggravation.

When it is doubtful whether nervous symptoms are expressive of serious disease, or merely of hysterical excitement, this state of the heart's rhythm might give essential aid in diagnosis; for in the latter class of affections, there is unwonted sharpness of the heart's contractions, and the two sounds almost run into each other.

Countenance.—The expression of the countenance is very peculiar in confirmed softening; and in old chronic cases that mixture of imbecility and astonishment, which is so justly held to portray the disease, is strongly impressed on the features, suggesting at once the existence of the lesion.

The face is often distorted from palsy of the facial muscles; the features are in general elongated on the palsied side as in other forms of hemiplegia. But sometimes the contrary effect is produced, the face being drawn towards the affected side. Many explanations of this occurrence have been suggested.

There is probably a similar state of the muscles of the face in these cases, as that producing contracture of palsied limbs; they are in a state of tonic spasm so powerful, that in this forced contraction they drag with them the muscles of the opposite side, and thus keep them on the stretch.

Some other peculiarities in the form or expression of the countenance have been thought to accompany softening. Flushing of the face often occurs, especially at the approach of the final adynamic stage, when the countenance is generally red, and the head covered with sweat.

Durand-Fardel has observed augmented secretion from the follicles of the eye and mouth: this sign too is rather indicative of the last stage; at that period the eye-lids are commonly glued together by dried mucus, the head is bathed in moisture, and the bronchial rattle is heard over the chest. The concurrence of these signs makes it probable that the great secretion from the bronchial lining in these circumstances is a passive flux, and not dependent on bronchitis.

Causes of Cerebral Softening.—More than the ordinary amount of difficulty attends an enquiry into the ætiology of this disease; for cases of cerebral softening have seldom been arranged separately in statistical returns, or even in those which are more strictly medical; and, indeed, there is too much remaining uncertainty in regard to its symptoms to admit of a more rigid classification, except when the existence of the disease has been verified by dissection. In attempting to trace its causes I shall mainly trust to these latter cases, without, however, overlooking other means, which although less worthy of reliance, might assist in confirming the results obtained from more authentic sources. By a strict and careful enquiry into the causes of this affection, some material aid in discovering its nature and pathology might be supplied.

Hereditary Predisposition.—The disease is generally supposed to possess the hereditary character. It is difficult to say upon what evidence this opinion is founded, for the published cases are usually incomplete in this respect. To my enquiries on the subject the reply has been commonly in the negative, the origin of the symptoms being usually attributed by the patients or their friends to some accidental circumstance; and, after abstracting the examples of the disease consequent on insanity, there seems no sufficient reason to conclude that family tendency has much influence in its causation. So remarkable a circumstance as the re-appearance of the disorder in successive generations would not be likely to be overlooked, and perhaps the occasional occurrence might have led to erroneous impressions as to its frequency. At least it appears to be much less strikingly hereditary than some of the other affections of the nervous system.

Temperament.—Scarcely more ample materials are afforded for deciding upon the prevailing temperament. Of 33 patients, Andral mentions 7 as having a strong constitution. From a summary of the cases in which the temperament is mentioned, it appears that there is a marked prevalence of the sanguineous and nervous, the former rather preponderating. A circumstance of some moment is, that a considerable proportion of those attacked have either undergone some debilitating course, or were originally of a feeble constitution. Of 72 patients in whom the disease commenced spontaneously or without any obvious cause, 32 had their health broken down prior to the attack. In weighing the circumstances that give a tendency to the complaint, this fact deserves consideration.

Sex.—The comparative frequency of the disease in the sexes is differently stated by authors, according to their individual experience. Andral collected 116 examples of fatal softening, of which 69 occurred in females, and 47 in males. In 100 cases taken from various sources, I find that the numbers were 42 males and 58 females. These two statements together give the proportion as 89 males, and 127 females.

The returns of the Registrar-General shew that the aggregate mortality from diseases of the brain and nervous system is much larger in males than females; and it is remarkable that the same rule applies to infancy, before the sexual tendencies can be supposed to have come into operation.

But this observation is not applicable to paralysis, which is probably the disorder that in these tables might be most safely taken to represent cerebral softening. It is remarkable that although this affection appears by these papers to be in almost every variety of circumstances more frequent in females, the opposite statement is commonly made by writers on palsy.

In this respect, the evidence from these calculations, and that founded upon the inspection of fatal cases of softening coincide ; and the fact is not without practical importance, for it indicates a proneness in the female organism to this cerebral change, which is the more remarkable, because its general exciting causes are of a kind to which individuals of the opposite sex are more frequently exposed.*

There is one very remarkable exception to this rule in the general palsy accompanying insanity, which is notoriously more prevalent as well as more rapidly fatal in men than women.

Age.—The influence of age in predisposing to softening of the brain is one of the most interesting circumstances in its history. Andral constructed a table giving an analysis of the ages of 153 patients, to which in the following summary 97 more are added.

	Andral.	Others.	Total.
15 to 20	10	6	16
20 to 30	18	14	32
30 to 40	11	8	19
40 to 50	19	13	42
50 to 60	27	12	39
60 to 70	34	27	61
70 to 80	34	16	50
Above 80	0	1	1
	153	97	260

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* The following abstract from the Sixth Report of the Registrar-General, pp. 102-108, exhibits the number of cases of paralysis in the sexes in several counties.

Males ...44, 65, 39, 55, 37, 35, 19, 32, 33, 32, 8, 14, 17 = 430.
Females..53, 70, 40, 87, 42, 31, 39, 27, 35, 30, 11, 27, 28 = 520.

Taking palsy again as the nearest representative of the disease in the Reports already referred to, it is found that there is a general correspondence of result in the proportion of cases at different periods of life, with that exhibited above.

Without at present discussing the more intimate pathological relations of softening, it may be worth noticing that its attacks seem to be most frequent, precisely at those ages when the acute inflammatory cerebral affections prevail the least, and to observe an inverse ratio in regard to frequency with those disorders, at all periods of life.*

The fact therefore that the disease is most common in advanced life may be regarded as fully ascertained. On this point there is a general concurrence of the testimony derivable from different sources. It is found in the cases where the existence of softening was demonstrated by actual dissection, and in those which, judging from the symptoms, might be reasonably set down as examples of the disorder; moreover, this result accords almost universally with the experience

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* This will be seen very strikingly in the following Extract from Reports, 1843, p. 316.

	Cephalitis.	Palsy.
Under 5	1967	61
5 to 10	3422	321
10 to 15	2538	508
15 to 20	1945	—
20 to 30	1072	69
30 to 40	949	1675
40 to 50	1325	3050
50 to 60	732	3885
60 to 70	470	5759
70 to 80	—	572

of those who have paid the greatest attention to the subject. It will be observed too, that the increase in old age is not relative merely, but absolute; and when it is remembered how few, comparatively, attain that period of life, this predisposition will be more strikingly apparent. This is a circumstance of no small significance in reasoning upon the nature of cerebral softening.

The common opinion that this morbid change very seldom affects the infantile brain, seems to require some modification. In hydrocephalus, for example, the structure of the organ is sometimes broken down; and although the softening in these cases is by some regarded as spurious, there are good reasons (which will afterwards be mentioned,) for the contrary opinion, that the injury is the result of the disease. This accident sometimes appears to give rise to a group of symptoms by which its existence might be recognised even during life.

Neither is it very uncommon to meet with children having some form of paralysis, which came on after acute cerebral symptoms. Some of these cases have the distinctive signs of cerebral softening; the faculties are seriously injured; the speech imperfect; the countenance vacant; and there is loss of voluntary power in one or more limbs.

A little girl, aged 6, came under my care a few years ago with hooping cough; the paroxysms were excessively severe, and left her exhausted, and with some degree of stupor. Her friends observed that she never moved the right limbs; and on examination, it was found that there was hemiplegia of that side.

Although she seemed to understand the questions addressed to her, she was unable to utter a syllable in reply, making a moaning noise in the attempt, but no articulate sound. The tongue was protruded firmly and equally. She gradually recovered the use of the limbs and of speech; but for a time there was considerable hesitation, and she spoke (as her mother expressed it,) in the manner of an infant who is learning to talk. At the present time, two years after the attack, the symptoms have nearly disappeared; but there is still some feebleness of the right side.

Rilliet and Barthez* found but two examples of idiopathic softening in the infantile brain. In one, a child, aged 3, was palsied on the right side after an attack of convulsions, and remained in this state until death, which took place 40 hours afterwards.

The left corpus striatum was reduced to a reddish brown pulp, having no trace of organization. The other portions of the brain were healthy.

In the other case, the brain and cerebellum were universally softened, in a child of 3 years of age. Without previous symptoms, he began to complain of headache and want of appetite. On the following day stupor came on, and he died suddenly.

A form of cerebral softening described by Billard† and Dr. Copland, requires a brief notice. The whole organ appears to be involved in these cases; the substance is red and congested, and reduced to a pulp; the characters are rather those of decomposition and putrefaction than of a morbid process, and the brain emits an odour of sulphuretted hydrogen: but Dr. Copland thinks, with Billard, that this softening sometimes commences before birth.

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* Rilliet et Barthez, Traité Clinique et Pratique des Maladies des Enfans, vol. I, 1843.

† Billard C., Traité des Maladies des Enfans nouveaux-nés.

The type of the disease seems to be in some degree influenced by the period of life. In 63 cases, the average age of the patients who died of acute softening, was 45; while in the chronic form, it was as high as 65. This result coincides with the general observation of the disease, which more commonly takes the chronic character in the aged, than in those in the vigor of life.

Climate and Season.—Rostan says that this affection is most frequent when the weather is in the extreme either of heat or cold. Chronic cases in old people commonly terminate in the cold wintry months, from pectoral complication; but these, of course, should be excluded from an enquiry where the question regards predisposition, which can only be ascertained by observing the period of attack.

In 64 cases where this circumstance is mentioned, 23 began in the first quarter of the year, 15 in the second, 12 in the third, and 14 in the fourth. These numbers shew rather a preponderance of attacks in the cold season, a result which a variety of circumstances might assist in producing.

Cerebral softening does not appear to be a prevalent affection in warm climates. The Army Medical Reports rather lead to the conclusion that it is less frequent in those latitudes than with us; and this accords with the experience of physicians who have practised in tropical countries. Nervous affections of another class—epilepsy, meningitis, and insolation, are infinitely more common there than in temperate latitudes; but the chronic softening at least, of which palsy or mental imbecility are prominent symptoms, is not a frequent malady of hot countries.

State of Society.—It would be interesting to determine whether there is any condition of society, or any class of occupation that gives a predisposition to the disease. It is a common remark that nervous affections have been greatly increased by the progress of civilization; but the means of arriving at any conclusion on this point are very deficient in precision. Heberden says, that "the yearly sum of deaths, ranged under the heads of apoplexy and palsy, suddenly fluctuates, without any certain increase or decrease, till the beginning of the 18th century. From that time to 1800 the proportion they bear to the whole number of deaths may be observed to be gradually and certainly increasing."

Medical Statistics were, until recently, so inaccurately examined, that no confidence can be placed in the old records in enquiries of this kind; but, after making every possible allowance for error, there will remain much reason to imagine that the deaths from these causes, in proportion to the population, are still on the increase.

According to the best authorities, the population within the Bills of Mortality in 1660, was 384,000; the deaths under the heads of palsy, apoplexy, lethargy, and planet-struck, were only 93; shewing so enormous a discrepancy with the present mortality from these causes, that it is impossible to put the slightest faith in the returns. In 1801, greater precision was introduced in the collection of these facts, although the statements are still very far from correct. The population at that time was about 747,043;* the deaths from apoplexy and palsy were 427, or about 1 in 1047 of the population. In 1840 as many as 1 in 359 died in London of these diseases.

Occupation.—Some important facts might be discovered respecting the general causes of cerebral softening, by observing its comparative frequency among large masses of people existing under different circumstances. The most valuable and trustworthy information of this kind is probably furnished by the Army Reports. According to Major Tulloch, the proportion of brain-diseases in our army is not above half that of civil life; and after withdrawing the deaths from delirium-tremens, which are numerous among soldiers, their relative frequency would be still lower. Large allowance must of course be made for the circumstances favorable to health in which these men are commonly placed, and for the vigor of life in which the bulk of them are; but taking these into consideration, the fact still remains of much significance, shewing that the anxieties and cares, and deprivations incident to the multitude, greatly predispose to this class of affections.

Pursuing this enquiry into its more intimate relations, it is found that nervous affections are much more prevalent in large and populous cities than in rural districts. The deaths from the aggregate diseases of this class appear to be more than double in the metropolitan than in an equivalent country population. But if the question is limited to the affections most nearly connected with softening of the brain, the discrepancy between the mortality in town and country is less remarkable, although it is still quite apparent, as will be seen in the following abstract:*—

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* Marshall. Statistical view of Diseases within the Bills of Mortality. 1832.

Deaths in London.		Equivalent Rural Population.
Apoplexy	525	344
Palsy	353	251

This advantage of the agricultural over the metropolitan district is not by any means maintained in country towns, some of which shew an average mortality from these affections above that of London. There is, however, no uniformity of result in this respect in accordance either with the nature of the manufacture or other appreciable circumstances; except that, almost invariably, the deaths from these causes are more numerous, relatively, in the smaller country towns, and especially in the sea-port towns of small size.

There is a notion still prevalent, that literary occupations commonly lead to serious disease of the brain. A glance at a Biographical Dictionary would disprove this assertion by shewing how large a proportion of eminent men attain old age. Frandini found that 18 out of 104 celebrated mathematicians attained the age of eighty, and two of them died at ninety. M. Beroux

* Reports of the Registrar General, 1840.

says that the average age at which 152 literary men of France died was as high as 69.

But some employments, requiring the continual stretch of the mental powers, are certainly injurious to the cerebral organization. Tissot thought that, in medical men, the evil effects of over study were counteracted by the exercise that their vocation demands. Dr. Winslow, however, mentions instances where the anxiety and labour of an extensive practice led to symptoms of softening. Some celebrated lawyers appear to have died of this disease. When we consider the unceasing exertion of mind which the business of a successful barrister demands, and that the brain, already over-strained, may, at the approach of age, be still further oppressed by the duties incident to the judicial office, it cannot be a matter of surprise that it should occasionally be destroyed.

The materials are but scanty for obtaining the frequency of cerebral disease among the mercantile community; the tables of Mr. Morgan offer, however, a few suggestions on this point. By them it appears that of 152,000 persons insured between the years 1801-1821 there died of apoplexy 242, and of palsy 115. This is at the rate of but 17 deaths annually on this number, a ratio far below the general standard. It may be fairly assumed, that the majority of the assured were of the middle or mercantile class.

The artizans who might be expected to be most prone to this class of disorders are workers in metals, and especially those who continually inhale pernicious metallic fumes. But an appeal to facts will not justify this opinion. Indeed it is a remarkable character in the affections dependent on this cause, that the mind generally is clear, and the memory unimpaired, at least until the latest stage. It is common to see a patient with his limbs palsied and rigid, and the muscles wasted from the effects of the lead poison, while the higher cerebral functions remain untouched; and it is quite the exception, even in old protracted cases, that these persons become imbecile, or indicate the signs of cerebral softening. It is the same in regard to the workers in mercury and copper. In the former the tremors and palsy are often extreme, but the memory and judgment are unimpaired. In the copper smelting districts, and in towns where the hardware manufactures are carried on, there is no increase of the diseases commonly allied with softening of the cerebral structure.

The general causes of disease are upon the whole less influential in this affection than in some other diseases of the nervous system. It is indeed remarkable what a large proportion of these cases have an individual history, in which some circumstances bearing exclusively upon the patient have apparently occasioned the malady, either acting as a direct irritant upon the brain, or else inducing its disorganization through the derangement of other organs. These circumstances will therefore in the next place demand attention.

Shock or Injury to the Head—The connexion of cerebral softening with an injury of remote occurrence forms a pathological enquiry of great interest. The relation of the disease to its cause, in some instances of this kind, might perhaps be regarded as too distant to warrant the idea of such an origin, which, nevertheless, is as capable of proof as any other medical problem. Thus, a healthy individual receives a severe blow on the head, which stuns him at the moment, but, with the exception of some temporary symptoms, it has apparently been productive of no mischief. Some time afterwards, however, occasional reminiscences of the accident are felt. Headaches, previously unknown, begin to torment the patient; or he has attacks of giddiness, or it may be of epilepsy, or he suffers from nervous symptoms of some kind, that prior to the injury he had not experienced. A common course in these cases is that, after a cause of this kind, the brain suffers under the application of an exciting cause otherwise than formerly. Thus it is found that mental straining or anxiety, or the partaking of even a moderate stimulus, induces confusion of thought, vertigo, and other symptoms. It rarely happens that the characteristic signs of ramollisement follow closely upon this accident. Months, or years, may elapse when the brain is in a state of irritability, rather than of actual disease; and it would be more correct to assert that its predisposition to deranged action is largely augmented by such causes, than that disease is actually developed. But unless great care is taken, and the patient can be placed in circumstances that permit quietude to the excited organ, there is most imminent danger of its structure breaking down, which commonly happens as the patient approaches the age when the tendency to this occurrence is increased.

Mental Agitation or Shock.—Patients frequently refer their disorder to some circumstance that had caused severe mental distress; and particularly to some shock to the nervous system, such as the sudden communication of bad news, a fright, or something that had occasioned excessive agitation. Making great allowance for the disposition in most patients to refer their troubles to some all-absorbing event, there still remains evidence enough to satisfy the most sceptical, of the reality of this kind of action. Lallemand observes that the moral affections are much more frequently the cause of brain-disease than is commonly imagined; but numerous circumstances prevent the whole truth being known in this respect. Rostan, Andral, Fuchs and others cite cases that originated from this cause. Not that the disorganizing process commences immediately after the application of this cause, but as in the preceding instances, the brain, from that time, has its functions impaired. At a later period the memory fails; palsy is threatened; and the signs of softening are presented unequivocally. However difficult it may be to explain the mode of action of this cause, it is impossible to deny that it is of great frequency, and one which cannot be overlooked in the history of this disease.

Alcoholic Drinks.—Beyond the general fact that habitual spirit-drinking acts injuriously on the brain and nervous system, the operation of this cause is still very incompletely understood. The old sot commonly enough terminates his career in a state of imbecility and palsy, the consequence of the breaking down of the cerebral tissue. In every instance that has come under my notice, and in all those that I have found detailed elsewhere, the softening process connected with this origin, has been found in connexion with signs of old membranous inflammation. The history of most cases of this kind leads to the same conclusion, that the disease rarely follows as the immediate consequence of a debauch, but appears after a long continuance of the excitement in which the cerebral membranes partake; for these persons suffer variously from nervous symptoms before they pass into fatuity and decrepitude. Some years ago I endeavoured to ascertain, by means of my Dispensary practice, the class of affections occasioned by this pernicious habit. About 15 per cent. only of these patients complained of marked disorder of the cerebral functions; the remainder suffering from gastric or hepatic affections, or kidney disease and dropsy. The nervous disorders were principally vertigo, headache, delirium tremens, with signs of irritation or membranous inflammation. Probably the meningitis in some of these cases should itself be regarded as secondary only, being the result of some previous change in the liver or alimentary canal or kidney.

Influence of other diseases.—The dependence of softening on the morbid conditions of other organs forms an interesting portion of its history, through which a clearer apprehension of its nature might be obtained. This lesion often follows in the wake of former disease situated within the cranium, as will be more distinctly pointed out when speaking of its morbid anatomy. There is often, however, no other correspondence between these two affections beyond their relation of cause and effect; for they may differ widely in their nature; and one has often a date long anterior to the other.

Heart.—The agency of affections of the heart in causing those of the brain, has given rise to considerable discussion. The subject is more complicated than at first sight it may appear, and it is by no means decided what form of cardiac lesion most generally leads to this result, or by what kind of action it is effected. It has, however, been long known that hypertrophy of the left ventricle often occasions cerebral congestion and apoplexy: Bricheteau and Bouillaud consider that it likewise leads to disorganization of the texture of the brain. Durand-Fardel, on the contrary, maintains that this hypertrophy is not found in a greater ratio in cerebral softening than is common in persons much advanced in years.

Another class of valuable facts bearing on this question was first noticed by Dr. Craigie,* who found brain-disease associated with valvular affections of the heart, and especially with those of the mitral valve. He supposes that these disorders, like hypertrophy, act in the first instance in causing congestion of the cerebral vessels, and that other affections of the brain are subsequently induced.

A totally opposite view of the immediate effect of valvular affections of the heart on the condition of the brain, has been suggested by Dr. Law.† He considers that their tendency is to produce an exsanguineous state of the cerebral vessels rather than congestion. When, for example, there is obstructive disease of the aortic or mitral valves, the blood is conveyed to the head in a diminished stream, in consequence of the circulation through the central organ being impeded; the same result ensues in regurgitating disease, by the reflux of a portion of the blood into the heart with the diastole of the ventricles. In either case the supply of the nutritious fluid to the brain must necessarily be less than in the normal state of the circulation.

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* Edin. Med. and Surg. Journ. vol. XIX. 1822.

† Dublin Med. Journal, vol. XVII. 1840.

Although there can be no doubt that the affections alluded to may give rise to venous congestion, by retarding the return of the blood to the right side of the heart, yet, in general, the effect on the brain is, I believe, precisely that described by Dr. Law. This is not only evinced by the anæmic condition of its vessels, as exhibited on post-mortem inspections; but also by the character of the symptoms, and the class of remedies found most useful in relieving them. The patients usually suffer from vertigo and faintness; the surface is pale, the extremities cold; the pulse is small and scarcely perceptible.

The advance of the cerebral disease is sometimes even more obviously connected with anæmia; for after frequent attacks of giddiness and syncope, some degree of hemiplegic weakness is experienced, which gradually passes into perfect palsy, while at the same time the memory and judgment fail.

The following summary will probably give a fair representation of the comparative frequency of hypertrophy and valvular disease of the heart in softening of the brain.

Rostan mentions the condition of the heart in 18 of his patients. In 6 it was hypertrophied without valvular disease; in 4 with that complication; in 1 with adhesion of the pericardium. In 4 cases, there was valvular or aortic disease without enlargement. In 1, the heart was pale and fragile.

In 32 cases detailed by Andral, hypertrophy without other lesion was found in 4; with valvular or aortic disease in 5: with redness of the lining membrane in 1. In the remaining 20, the organ was healthy.

Lallemand found an enlarged left ventricle in three instances; in two of which there was obstructive disease at the aortic orifice. Bouillaud also mentions 3 patients in whom the same lesions were observed.

In 29 of my cases where the condition of the heart was noted, there was valvular disease in 4; hypertrophy in 2; feebleness of the heart's impulse in 5; the organ was healthy in 18.

From these facts it would appear that an hypertrophied left ventricle is less influential than valvular disease in the causation of softening of the brain. It should not be overlooked, however, that in the majority of cases of that disease the heart is healthy; and on the other hand, a large proportion of heart-affections is unattended with cerebral softening. It would be most erroneous to conclude also, when the two lesions coexist, that the one is necessarily occasioned by the other. Strictly speaking the heart-disease ought in many instances to be regarded as but typical of general derangement of the vascular system. This view, suggested by Dr. Copland and Dr. Watson, has been confirmed by recent discoveries which will be presently detailed. But again it would be straining this point too far to imagine that in all cases where affections of the heart and brain are found in the same patient, there is disease of the cerebral vessels; the contrary is indeed often observed in post-mortem examinations.

Among the morbid appearances detailed by writers on cerebral softening, it is often mentioned incidentally that the texture of the heart was soft and pale, or readily lacerated, but without inferring that there was any alliance of the brain-disease with this condition. These facts, however, have become important by the discovery of cerebral softening in connexion with fatty degeneration of the heart. Several cases in which the symptoms of both these affections existed, have come under my notice, in all of which the arcus senilis, which Mr. Canton has found to consist of fatty matter, was distinctly marked. There is reason to conclude that in some of these patients the brain had undergone a similar transformation; and it is extremely interesting to observe the alteration of structure thus visibly displayed in the eye, manifesting itself scarcely less perceptibly in internal textures. The heart-sounds are distant and obscure, and the impulse feeble; while the drawling enunciation, mental imbecility, and palsy, announce disintegration of the substance of the brain. The malady under these circumstances pervades the whole system, and the brain can hardly be said to have suffered in consequence of the condition of the heart, although the latter is probably not wholly inoperative in this respect.

Lungs.—The organs of respiration are commonly found diseased in fatal cases of cerebral softening; but the connexion between these disorders is not always of the same kind. It has already been remarked that pneumonia or bronchitis is sometimes set up in the latter stages of the brain-affection; but the reverse of this course appears to take place in some instances, where the cerebral disturbance supervenes upon pectoral disorder. This consequence is most frequently observed in regard to pneumonia, and especially when the lung remains condensed and hepatized, and the health and strength are seriously impaired. It is remarkable that the irritation under these circumstances seems to be transmitted to the cerebral hemisphere of the opposite side to that of the diseased lung. In 28 cases where the vestiges of a former pneumonia were found in connexion with softening, the diseases occupied opposite sides of the body in as many as 24.

The frequency of cerebral disorder in consumptive patients remains undetermined. In the wasted condition of the system, consequent on this disease, spurious softening would be likely to occur, and this circumstance might have led occasionally to erroneous conclusions. But on the other hand, it is undeniable, that this disease sometimes comes on in the latter stages of phthisis, and apparently in consequence of it. Some years ago, I examined the body of a consumptive patient who, for several weeks before he died, had many of the most decided signs of cerebral softening. The left limbs were palsied and contracted; the mind was weakened, and he was nearly speechless. The right corpus callosum and other parts within the ventricle were reduced to a pulpy mass, which was pale and without any trace of vascularity. Louis had a patient with an excavation in the summit of the left lung. A few days before death cerebral symptoms made their appearance. The patient could not reply to questions although he understood their import, and he soon fell into complete stupor. Portions of the cerebral structure were broken down. Louis found partial softening of the brain equally frequent in other chronic affections as in phthisis; but he had never observed apoplexy under such circumstances. The probability of the existence of softening is therefore great, when cerebral symptoms, denoting stupor, paralysis or contracture, are seen in the latter stages of phthisis. These are not often met with, however, in this disease, in which the mind remains clear and intelligent usually to the last hours of existence.

Organs of Digestion.—It might have been anticipated from the intimate sympathies existing between the alimentary canal and brain, that the latter would be liable to have its structure altered from the continuance of gastric and intestinal irritation.

The fact is, however, that this affection of the brain is far less frequently associated with disorder of the digestive organs than with the pulmonary; and this remark applies equally to the acute and chronic maladies of the alimentary canal. Even in the follicular disease, where the cerebral functions are profoundly affected, this morbid change is seldom seen. Andral has detailed 134 histories of this affection, in all of which the brain functions were seriously impaired, and death in most instances occurred from coma. Yet with but one doubtful exception, the tissue of the brain was not changed from the consistence of health.

Kidneys.—Neither does disease of the kidney often lead to this result. In some of these affections the brain becomes deeply affected, the most complete coma being induced; this effect is not occasioned by breaking down of its structure, but principally from the irritation dependent on the imperfect elimination of the urea.

Fever.—Symptoms bearing a close resemblance to those of cerebral softening sometimes appear after an attack of fever, which may remain for a considerable period, but finally disappear.

I attended a young woman in Gloucester-street, who had just undergone an attack of fever with cerebral complication. The mental powers were almost entirely lost, and there was a fatuous expression on the countenance. The speech was extremely imperfect, and the few words that her memory could supply, came from the lips in a drawling and hesitating manner. The motor functions were nearly suspended; she could not move across the room except with the support of two persons, nor could she employ her hands in any kind of occupation. After a few weeks the condition of the patient was sensibly improved; the utterance, although still very imperfect, was rather more distinct, and the power of voluntary motion was partially restored; but it was several months before she was able to employ her hands even in coarse needle-work, or to move without help. She eventually recovered the complete command over the movements and the speech, and the mind was also re-established in its integrity.

The condition of the brain in these cases has not been satisfactorily determined. The pertinacity of the symptoms militates against the opinion that they are merely the consequence of the previous shock to the nervous system; and indeed their whole history points to some change in the physical properties of the brain, not of a region only, but affecting the whole organ, and of a kind that time is capable of renovating completely. Gluge says that the nervous canals are often wasted in severe attacks of fever, so that their *contour* can scarcely be recognised. This morbid change occasions a diminution of consistence of the cerebral tissue, which differs from the ordinary softening in that there is no breaking down of the structure, nor are there any traces of inflammatory or other foreign products seen under the microscope. It seems probable that an unusual amount of this change might occasion the symptoms here alluded to.

External Injuries or Irritations.—It is a matter of common observation that paralysis or other signs of cerebral disorder sometimes follow the drying up of an old ulcer. The opinion that congestion or apoplexy is thus excited may probably be correct in some instances of this kind; but there are other facts which seem to imply that external irritations are capable of being transmitted, by means of the nerves, to the central organ, by which an action is set up that leads eventually to the destruction of its tissue. In these cases the law of cross-action is observed, as in palsy, but in the inverse course; a wound or sore of one side of the body occasioning disease of the opposite cerebral hemisphere. This course is sometimes exemplified in a manner so obvious that it scarcely admits of dispute, the cerebral disease following immediately upon an injury to a nerve, as in some of the following examples. I have extracted those facts only that bear upon the present enquiry.*

A soldier, aged 38, was wounded by a lance in the right shoulder; a large aneurism formed on the axillary artery, and the subclavian was tied above the clavicle. At the moment of tightening the ligature the patient experienced sharp pain in the neck, which subsided afterwards, but was again augmented in severity about the seventh day after the operation. On the same evening he was attacked with loss of consciousness and convulsion, and died on the following day. *Inspection.*—The ligature had included the artery with some branches of the brachial plexus. The posterior portion of the left cerebral hemisphere was of a greenish color superficially. Beneath, it was disorganized, and retained the same tint. In the midst of this altered tissue was an abscess, which contained about a spoonful of thick green fluid. Around the softened portion, the cerebral substance had a rather firmer consistence. The vessels of the pia mater were a little injected, the arachnoid was smooth and transparent, the ventricles contained a little colored serum.—LALLEMAND.

A man, aged 36, about a year before his death, had a tumor extirpated from behind the angle of the jaw, on the left side; and immediately after the operation, paralysis took place in the left side of the face. About six months afterwards he began to complain of headache and giddiness, which often had the appearance of intoxication. These symptoms were followed by impaired vision, occasional strabismus, and some degree of deafness, and at last by drowsiness, coma, convulsions, and death. *Inspection.*—In the centre of the middle lobe of the right hemisphere of the brain there was a tubercle about an inch long, and three-fourths of an inch in breadth. In the vicinity there were increased vascularity, and softening of the cerebral substance.—ABERCROMBIE.

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* A paper on this subject, by the author, was inserted in the Med. Gazette, 1849.

A young lady, aged 18, who had enjoyed good health, except from a scrofulous sore on the left arm, began to complain of severe headache with much fever, and of great oppression. She died rather suddenly. *Inspection.*—In the substance of the right hemisphere, there was a soft tubercular mass of large size; and there was considerable ramollisement of the cerebral substance surrounding it.—ABERCROMBIE.

A woman, aged 55, had all the symptoms of organic lesion of the heart. She was bled; after which she became agitated and delirious. Two days after the bleeding the arm became swollen and painful. The oppression and delirium increased until she died. *Inspection.*—The pia mater was infiltrated with serum. At the anterior point of the left cerebral hemisphere, the brain had a deep red tint, principally occupying the medullary matter, which was slightly softened. The cellular tissue of the right arm was swollen and friable, and of a grey colour.—DURAND-FARDEL.

A girl had a whitloe on the finger, with abscesses in the axilla and fore-arm. The fore and middle fingers of the right hand were filled with pus and blood, and in the right fore-arm and thigh there were also abscesses. A portion of the left hemisphere of the cerebellum was completely softened.—BRIGHT.*

Mrs. Sharpe, aged 54, came under my care at the Charing-Cross Hospital. A few days previously she lost the power of the left arm, having suffered from headache, sickness, and vomiting, before the attack. She had an open ulcer in the left leg for nearly two years. It was once healed for a short time; but it broke out afresh. At the present time, it is healing again.

For the following case I am indebted to my pupil, Mr. Handsley:—An old man, aged 70, of drunken habits, had been for some years an inmate of St. Martin's Workhouse. His mind was weakened, but not to any great extent. For some time he had been subject to a troublesome eruption on the left leg, from which, at times, a copious sero-purulent discharge proceeded. A few weeks ago, this man was suddenly seized with coma and paralysis of the left side, in which he continued until he died. His friends would not permit the body to be examined.

Mary King, aged 49, now an out-patient at the hospital, received an injury to the left shoulder about six years ago from a fall. The limb was severely bruised, much swollen, and very painful; and when these symptoms subsided, some degree of feebleness remained in the arm. Shortly afterwards she suffered from severe paroxysms of neuralgic pain about the humerus, and there was considerable weakness in the limb. About two years ago the left arm began to shake, its power at the same time being sensibly diminished. For several months it has been continually agitated with short tremulous movements, like those of paralysis agitans, which are not suspended even in sleep. The leg of the same side is also losing muscular power. The memory is not seriously impaired. There is headache occasionally of a severe character in the right parietal and frontal regions.

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* Reports of Medical Cases, vol. II.

In all the above cases the brain was diseased on the side opposite to that where the external lesion was seated. The facts may be insufficient to establish the point of pathology to which they refer, yet I think it can hardly be imagined that a circumstance so frequently repeated was entirely accidental.

Exciting Causes.—In the preceding remarks I have not attempted to draw the line strictly between the predisposing and exciting causes. The distinction in many instances is not easily made; for the same kind of influence that had created the predisposition, may, by its continuance or renewal, act in the manner of an exciting cause. When, for example, the brain has been injured by a long course of intemperance, the disease may come on from a repetition of the debauch. When the proneness to morbid action is engendered by anxiety, night watching, or over study, the symptoms often assume activity when the same causes are repeated.

The more obvious action of an exciting cause is, however, often perceptible. Of these, the principal are, deep chagrin or disappointment, prolonged mental application, want of sleep, excessive fatigue, long fasting, intemperance, venereal excesses, syphilitic attacks, exposure to wet and cold, or to the sun's rays, blows on the head, erysipelas of the face and scalp.

In a large number of cases, however, the action of an exciting cause is not apparent, especially in the chronic form of the disease; but the oppression of the brain commences and is augmented slowly and gradually without the intervention of any circumstance acting as a shock on the system; and even when the symptoms undergo a sudden aggravation, it is not always possible to discover any cause to which the accession can, with any probability, be referred.

Nature and Pathology of Cerebral Softening.—I approach this part of the subject with no little hesitation, for it is full of difficult questions, on which the most accomplished pathologists still hold opposite opinions. The facts now to be adduced will, I think, justify the conclusion that there are several morbid processes which lead eventually to the disintegration of the cerebral texture, each of which it is of importance to recognise in a practical history of the disease.

Before entering upon the enquiry into its more concealed pathology, it will assist materially to a just apprehension of the question, to examine into the physical properties of the softened tissue, principally in reference to its seat, color, and consistence, and the adventitious matters contained in it, and likewise into its relations with other morbid conditions of the encephalon with which it is often found in alliance.

Seat of the disease.—All parts of the brain are liable to this morbid change, but not in the same proportion: its relative frequency in the different cerebral regions will be seen by the following table, constructed by Andral, from an analysis of 171 cases. —He found

Softening of the whole of both hemispheres, in . .	4	cases,
„ nearly the whole of one hemisphere,	13	„
„ the convolutions alone, . .	14	„
„ the convolutions and other deeper seated parts . . .	9	„
„ the anterior lobes, . . .	27	„
„ the middle lobes, . . .	37	„
„ the posterior lobes, . .	16	„
„ the corpora striata, . . .	28	„
„ the optic thalami	15	„
„ the walls of the ventricles, . .	2	„
„ the cerebral peduncles . . .	1	„
„ scattered in various points, . .	5	„

In Durand-Fardel's cases of acute softening, the convolutions were affected nearly alone in 9 cases; with the medullary matter in 22; in 4, the disease occupied the corpus striatum; in 3, the optic thalamus; in 1, the softening was confined to the medulla; in 1, it was found on the surface of the cerebellum; in the chronic cases the disease was seated in nearly the same regions.

According to this author, the convolutions are attacked in a much larger proportion than other parts, both in the acute and chronic varieties. Andral holds the opposite opinion. He found when the portions above the ventricles were diseased, that a much larger amount of the white matter was involved than of the grey.

The two hemispheres appear to be attacked in nearly equal proportions, the right, perhaps, being rather more frequently affected than the left. Sometimes there is softening in both hemispheres, when almost invariably it is more advanced in one than in the other.

The extent of the disease varies greatly, sometimes occupying an entire hemisphere, or even involving the whole organ; or it may be limited to a small and scarcely appreciable spot. But a microscopic examination will often reveal the presence of disease in the structure surrounding those insulated portions, where, by the ordinary modes of investigation, no morbid change could be detected.

Color of Softening.—Of all the characters of the softened brain, that which has obtained most notice in support or refutation of certain theories, is the variety of tints that it presents. Too great importance has perhaps been given to this question; and it is certain that erroneous impressions have sometimes been obtained on the nature of the disease, from indications connected with its color.

Red Softening.—This variety is much more common in the grey matter of the brain than in the medullary. It is most frequent in the convolutions. Its source is undoubtedly the blood; either from its stagnation in the minute vessels, or from infiltration into the softened mass; or from both these conditions combined. Its intensity is very various, according to the duration of the disease, or the presence of certain morbid exudations in the diseased part.

The modifications of color effected by time in red softening, are similar to those observed in different stages of apoplectic effusions. In recent cases the softening has a deep red tint; this passes into a dark brown, which again becomes less obvious with the length of the disease, and probably is in time wholly obliterated.

But there are several other circumstances to be taken into consideration before any inference can be safely made from these shades of color.

The dusky red color is occasionally observed in perfectly recent softening, probably in consequence of venous congestion. This is chiefly seen in the grey matter of the convolutions and ganglia, and seems to be occasioned by the mingling of the purple blood with the dark pigment of the brain. This appearance is sometimes presented very distinctly in the corpora striata; they are much swollen and congested, and of a dark red color. Examined with the microscope, the texture is seen crowded with distended vessels, while blood corpuscles are exuded into the nervous tissue.

In the white matter a similar appearance is seen, but less frequently. The texture is evidently congested and swollen. Innumerable red points appear when a section is made of the diseased tissue, the blood oozing from the divided capillaries; and the softened portion is crowded with blood corpuscles.

But, on the other hand, the red softening may occur both in the grey and white matter of the brain, without either congestion or swelling, or even increased vascularity. Under the microscope the vessels shew no distension, but the texture is loaded with the blood-discs; the heightened color not being the consequence of hyperæmia of the vessels, but of the escape of the blood into the cerebral substance.

The redness may be produced in other cases, independently either of extravasation or hyperæmia, being merely a stain from the coloring matter of the blood. Vogel* says, that a careful examination would shew that the red color of tissues was due to their saturation with serum containing hæmatin in solution. He regards this as chiefly a cadaverous action, although occurring during life in gangrene and in putrid and petechial fevers.

It is evident, therefore, that very erroneous ideas of the disease might be obtained if redness of the softened brain were taken as a proof of an inflammatory origin. In many cases there is reason to conclude that it is an accident secondary to softening, in consequence of the exudation of blood into the diseased structure. The redness, too, is in a great measure dependent upon the original conformation of the affected part, especially in regard to its supply of blood. Thus it is often seen in the cortical substance without inflammation; while, on the contrary, softened medullary matter may contain the inflammatory exudations with little or no deviation from its natural tint.

A form of red softening, different in some respects from the foregoing, is occasioned by the escape of minute particles of blood from the capillary vessels, and its subsequent infiltration into the cerebral texture. Cruveilhier has named this affection capillary apoplexy (*apoplexie capillaire.*)

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* Vogel, J., Pathological Anatomy. Translated by G. E. Day, 1847.

In its early stage the blood is arranged in numerous small points, resembling petechiæ on the surface of the brain, being either exuded thickly in one or more patches, or spread over a larger surface. Sometimes these little extravasations run into each other, forming a continuous red patch like ecchymosis. The redness sometimes descends an inch or more into the cerebral mass. On its surface are spots darker than the rest, which probably mark the points of exudation.

The alliance of this effusion with softening is not always of the same kind. The texture of the brain may, in some cases, be broken down, prior to the escape of the blood from the capillaries. But the opposite course is more common; and, in recent cases, dark spots of coagulated blood are observed on the surface of the brain, which retains its healthy consistence. By the irritation of the foreign matter, the substance is subsequently destroyed; and the effused blood becoming infiltrated into it, red softening is produced.

Capillary apoplexy is confined to the grey matter of the convolutions. Diday* says, that its most frequent seat is the fissure of Silvius, and that when it is found in several parts of the same brain it is always more advanced in that part.

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* Gazette Medicale, 1837.

White Softening.—The limits to which the term, white softening, is applied, cannot be accurately defined; but it may be supposed to include the cases where the softened medulla retains its natural tint, or where, from some cause, it is of a paler color than in the healthy condition.

Some of the opinions entertained respecting the pathology of this species of the disease, are found to be erroneous. It was supposed, for example, that the shining tremulous cream-colored softening obtained its peculiar appearance from the presence of pus, and marked the suppurative stage of inflammation. But this notion has been completely overthrown by microscopic researches, which have proved that the softened mass, in these cases generally, contains no purulent matter.

Neither can it be asserted that the pale colorless softening denotes that there is simply wasting and atrophy of the nervous fibres; for it has been shewn by Gluge and Dr. Bennett, that the products of inflammation are sometimes exuded into it. This, however, is not an invariable appearance; the diseased brain, in some cases of this kind, being entirely free from adventitious admixtures.

White softening may also be occasioned by the infiltration of serum into the substance of the brain, by which its texture is loosened and partially comminuted. This would seem, however, to be quite an exceptional occurrence. Under some circumstances, again to be noticed, the brain becomes almost universally ædematous, and its texture is consequently soft, flabby and pale. But white softening commonly occurs without œdema; and, indeed, the quantity of serum found in the brain in these cases is often exceedingly small, scarcely a particle of fluid being collected even in the ventricles, or at the base.

Yellow Softening.—Rokitanski makes a distinction between yellow softening and the other varieties, regarding it as a different disease; but, if under this term, there are included all the conditions in which the nervous texture is diminished in consistence, and has the yellow tint, it is certain that the lesion may represent very different morbid states.

In the specimens which I have had the opportunity of examining, the yellowness was sometimes evanescent, but in most instances it was permanent. The appearance of the diseased structure generally bore the closest resemblance to a purulent collection, but in no case was pus detected under the microscope.

Confining the description to what I have myself witnessed, the following are the aspects which this species of softening may present.

The softened mass may be free from foreign ingredient of any kind, the nervous matter being merely reduced to fragments. In one example of this kind, the diseased portion was of a deep glossy yellow color when first exposed; but this appearance soon went off, and the yellow tint was changed into a dirty ash-color.

Rokitanski says, that the color of this softening depends upon the infiltration of a thin fluid, which can be squeezed from the disorganized structure; and perhaps the loss of color just referred to might have been occasioned by the subsidence of this fluid. The softened mass, however, usually retains its color until putrefaction is far advanced, and does not part with it under any kind of manipulation.

In other cases the yellow matter is loaded with oil-globules, which are deposited in the midst of the comminuted substance, and may sometimes be detected in the vessels ramifying through it. Examples of this variety will be again referred to.

The diseased structure is occasionally observed of rather a deeper hue, approaching a fawn-color. A specimen of this kind which I examined with Mr. Taunton, was wholly made up of nerve-fragments and innumerable blood-discs. The brain surrounding the yellow mass was likewise softened to a considerable extent, but its natural color was retained. In this latter portion numerous oil-globules were observed, and here and there an exudation corpuscle.

These are probably but a few of the modes in which yellow softening may occur; but they are sufficient to shew that the peculiarity of tint does not invariably represent the same morbid state. Nor does it appear likely that the yellowness is always communicated by the same ingredient; but it may sometimes be derived from the admixture of blood, at others from the presence of fatty matter, or from the presence of a yellow pigment otherwise derived.

According to Rokitanski, the circumstances under which yellow softening chiefly occurs, are the following:

1. It is seen encircling a spot of inflammation in the extreme boundary of the disease. 2. In the neighbourhood of the ventricles in acute hydro-

cephalus. 3. Around apoplectic extravasations, a portion of inflamed tissue in general intervening between it and the clot.

Dark Softening.—The medullary structure, when diseased, has often a dirty ash-color; and, even the granular matter may present a darker hue than in the healthy state. In the cases where this change has come under my notice, there was no appearance of congestion, either in the softening or the neighbouring texture. It is chiefly seen in the white matter of the hemispheres. I have met with it also in the corpus striatum and the convolutions.

Consistence.—The exact boundaries separating the healthy from the diseased structure are often difficult to determine. When the softening is far advanced, and a portion of cerebral texture is found loose, and diffluent in the midst of the otherwise healthy brain, little hesitation would be felt in attributing to it a morbid character. It is in regard to the less marked cases that there is sometimes a doubt, as all who have been accustomed to make such examinations must have experienced.

The common methods of testing the suspected portion with the finger, or the back of the scalpel, are frequently inconclusive. The plan of directing a stream of water on the part, will often break into shreds the delicate tissue of the brain where no disease existed.

The microscope sometimes gives important assistance in this difficulty. It will at least shew whether the nerve fibre is broken into fragments, and sometimes will afford complete evidence of previous morbid action. Dr. Bennett cites instances where appearances not appreciable to the naked eye were discovered by these means, removing all hesitation as to the nature of the disease; and he suggests that many obscure nervous affections might receive complete elucidation, if the microscope were employed in investigating them. But there will still remain some doubtful cases, which can only be decided by weighing all the circumstances connected with the symptoms and morbid appearances in each individual case.

The change of structure, as indicated by the microscope, in the softened brain, is much more remarkable in the white or tubular matter than in the grey substance. In the latter, the dark mulberry-like groups of granular substance are seen as in the healthy brain; and, probably, the softening does not so much depend upon a diseased state of these granules, as of the tissue in which they are arranged.

In the medulla the effects are much more palpably displayed. The tubular arrangement may be entirely lost. Some portions are reduced to a pulpy consistence, others present globular fragments resulting from the destruction of the tubes. Besides these changes, fibres more or less varicose, may sometimes be observed stretching across the softened mass.

The diseased brain often contains morbid products of various kinds, such as blood, or blood-discs, exudation-corpuscles, or oil-globules, and occasionally pus-globules, which will require a full examination. But before advancing farther in this enquiry, it is important to review the principal cerebral affections found in connexion with softening, and to which the latter may be supposed to be consecutive. The chief affections of this kind are meningitis, cerebral congestion, sanguineous apoplexy, and morbid growths, within the cranium.

Meningitis.—It is undeniable that the traces of a former meningeal inflammation are very commonly found in the softened brain; and so frequent is this occurrence, that it is important to ascertain the nature of the connexion.

This circumstance has been adduced, rather hastily I conceive, in proof of the inflammatory nature of the cerebral disease; but, it by no means follows that these two conditions, when co-existing in the same brain, are necessarily identical as to their nature, or that they commenced at the same epoch; indeed, there is often complete evidence to the contrary.

Taking, in the first place, the chronic meningitis, in which the successive stages of the process can be more deliberately followed, it will be found, both from the history of the case, and the post-mortem appearances, that the membranous inflammation and the softening are two different diseases, and that the relation to each other is that of cause and effect, and that by no means do they necessarily result from the same action.

There are in most cases of this kind two separate histories; the one belonging to the meningeal affection, the other marking the period when the substance of the brain began to give way; and it is remarkable that when the latter accident occurs, not only is it distinguished by certain external manifestations, but the symptoms of the prior disease disappear, and are absorbed, as it were, in the new malady. The attacks of violent headache, of wild excitement or convulsive struggling, that had attended the early stages of the disease suddenly terminate, and are replaced by stupor, fatuity, palsy, and the signs of a destructive process affecting the substance of the brain. It might be possible to read the history of these cases by means of the morbid appearances. The membranes are usually thickened and adherent, and bear evident marks of long-standing disease; and some portion of the cerebral substance is in a state of recent softening. Each of these lesions has a separate and individual character. In the brains of several insane patients who died with general palsy, which by the kindness of a gentleman connected with a large lunatic asylum, I was permitted to examine, the appearances now referred to were almost invariably presented. The membranes were thickened sometimes to an enormous extent, and adherent to each other and to the surface of the brain; and the central portions of the organ were more or less destroyed. To the former division, most probably belonged the paroxysms of mania and epilepsy which had marked the early history of these patients; while the palsy and dementia were coincident with the loss of cohesion in the texture of the brain.

When the softening is found associated with the signs of a recent acute meningitis, there is still some doubt whether it must necessarily be of an inflammatory origin. There is reason to conclude that inflammation of the membranes often occasions softening of the neighbouring substance, or even of more distant parts; not simply by the extension of that action, but by interfering with its nutrition, or in some other way causing disturbance, from contiguity of morbid action. Even in inflammation of the cerebral substance itself, the softening often extends far beyond the point inflamed. I had lately an opportunity of examining with Dr. G. Johnson, the brain of a man in which an encysted abscess was found near the base. The surrounding structure was softened to the extent of two inches. But in only one spot could any exudation-corpuscles be found; elsewhere the tissue was merely comminuted without the slightest trace of foreign admixture.

In acute meningitis, when softening occurs, there may be the same absence of the inflammatory products in the injured structure. A girl was brought to the Charing-Cross Hospital last winter, for concussion of the brain, and placed under the care of Mr. Avery. For several days after the accident she appeared to be going on well; when rather suddenly and without obvious cause, she became incoherent, delirious, and noisy, talking and crying out incessantly. These symptoms were soon exchanged for others, denoting cerebral softening. The power of speaking was lost; she gradually fell into stupor, and died comatose.

The marks of recent inflammation were observed in the membranes over the convexity of the brain. The substance generally was vascular, shewing numerous red points when divided, except a portion on the medulla above the left ventricle which was reduced to a pulp, and was free from vascularity. The nervous tubes at this place were universally comminuted. The softening terminated abruptly in the healthy structure. No exudation-corpuscle, or other extraneous matter could be detected after a careful search.

In acute hydrocephalus the texture of the brain is sometimes destroyed, either in the immediate vicinity of the inflamed membrane, or in the central parts of the organ.

The nature of this softening is still undetermined. By some it is held to be the result of inflammation spreading from the membranes to the substance of the brain. Others regard it as the consequence of acute œdema; while many deny its right to be classed as a morbid product, asserting it to be a post-mortem appearance occasioned by putrefaction, or serous infiltration.

The appearance of the softened texture, in many of these cases, is suggestive of any condition rather than inflammation. It is pale, anæmic, without even a trace of vascularity; and, so far at least as to its external characters, there is nothing to support this theory of its origin.

With regard to the presence of the inflammatory exudations, there appears to be no uniformity of result. In two instances which I lately examined, where there was extensive softening of the central parts, there were no foreign matters perceptible, but the nerve-fibres were much comminuted and varicose. Rokitanski detected the exudation-corpuscles in some cases, but in others they were absent.

A circumstance of importance in this enquiry is noticed by Dr. West, who found the lining membrane of the ventricles inflamed in 14 out of 17 cases of acute hydrocephalus in which central softening existed. He regards this fact "as affording strong proof of the close connexion between softening of the brain and an inflammatory process going on in the organ."*

This alliance does not necessarily warrant the conclusion that the comminuted substance itself had undergone that action. A fact of some weight in this enquiry is, that softening is much less frequent in simple meningitis than in the tubercular. Rilliet and Barthez found it but once in the former species; and although this view is probably too confined, it is certain that the complication chiefly belongs to the tubercular hydrocephalus; and if no tubercle is found deposited in the brain, it is generally detected in the lung, marking the scrofulous habit. In simple meningitis, then, where the traces of inflammation of the membranes are usually well-marked and prominent, softening of the substance is a rare occurrence; but, in the tubercular, where the inflammatory appearances are often slight and doubtful, the secondary affection is frequently observed. This circumstance, together with the pale and bloodless state of the affected tissue, and its freedom in many instances from foreign deposit, favor the notion that the softening is often the result of a process differing essentially from inflammation.

Rokitanski considers inflammatory softening to arise from œdema of the brain, the organ becoming rapidly disorganized under this action.

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* West, C., On the Diseases of Infancy and Childhood, 1848.

Of this affection he makes two varieties.

In the first, the serous infiltration that had caused the softening contains the common inflammatory exudations, the œdema being precisely similar to that which surrounds an inflamed spot.

In the second variety, the serous effusion takes place so rapidly into the ventricles, and causes so much distension, that, finding no other outlet, the fluid is exuded into the cerebral tissue and disorganizes it.

But, in many cases, this explanation is not applicable; for it not unfrequently happens in infantile meningitis, that the brain has its texture destroyed when the effusion is but slight, and where there is no œdema of the affected part; and in the instances where a large quantity of fluid has been collected in the ventricles or elsewhere, the parts in immediate contact with the serum often retain their firmness, when others more remotely situated, and not subjected to this action, are broken down. It must be obvious, therefore, that the softening cannot always be formed in this manner.

There is still greater difficulty in admitting that the loss of consistence of the brain, under such circumstances, is but a post-mortem change. On the contrary, there can be no question that it is often a morbid product, whose presence might be recognised by its symptoms; the group of signs supposed to mark the occurrence of effusion in meningitis, seems in some cases to be more immediately connected with softening of the cerebral substance; and most persons accustomed to inspect the dead body have probably been disappointed in their expectations of finding serous effusion within the cranium, which seemed to have been indicated by the progressive alteration of the symptoms. The following case is inserted as an example of this kind.

Thomas Harrington, aged 9, received an injury to the head, and for about two years he had suffered, occasionally, with headache and a feeling of oppression. Three days before I saw him, he had shivered and vomited, and complained much of headache. When I visited him he was feverish and oppressed; the pupils were dilated, but they contracted sluggishly at the approach of light; the vomiting continued, and he still complained of headache; the pulse was irregular and intermitting. The stupor went on increasing during the two following days; the whole body was frequently convulsed, with the exception of the right arm, which was evidently palsied; the pulse fell to 60. After some temporary improvement in the symptoms, the patient relapsed into insensibility; the pulse became extremely rapid, and he died comatose.

Inspection.—The membranes and convolutions were deeply injected. The sinuses were gorged with blood, and in the lateral sinus were clots of fibrine, which did not adhere to the sides of the vessel. The ventricles contained no fluid, but a small quantity escaped from the base when the brain was removed. The fornix, and the walls of the left lateral ventricle near its superior cornu, were reduced to a pulp.

Cerebral Congestion and Apoplexy.—Repeated attacks of cerebral congestion appear to be less instrumental in causing this affection than has been supposed. Not often are its symptoms observed as precursory to those of softening; and it is obvious that the structure of the brain is less liable to this danger from congestion than from meningeal inflammation. It is true that the cerebral vessels are frequently found distended with blood in fatal cases, and this condition might sometimes be the immediate cause of death; but, in general, it is more properly classed among the phenomena induced by the final struggle.

Rochoux and others maintain that the texture of the brain is almost invariably softened prior to the occurrence of apoplectic effusions, which they suppose are occasioned by the imperfect support afforded under such circumstances to the cerebral capillaries. But they appear to have over-estimated the frequency of this coincidence, or not to have given sufficient consideration to the fact that the structure is always more or less torn and comminuted around apoplectic clots, by the force of the effusion.

The only cases that can be safely employed in this investigation are those where death followed immediately upon the attack; for it is well ascertained that an action soon commences in the parts around the extravasation by which their consistence is speedily diminished; and, consequently, that in apoplexies of a few days' date, the brain in the vicinity of the clot is almost invariably broken down. But in perfectly recent attacks a different appearance is presented, and the disintegration of the cerebral substance is often visibly the consequence of its laceration; for it is observed at those points only where the force of the extravasation was greatest, and the effect is strictly limited to the portions subjected to that action. Rochoux says that when the hæmorrhage is caused by concussion, or a wound, or other accidental circumstance, the brain around the effusion is sound and healthy. Gluge, from his pathological researches and experiments, arrived at the opposite opinion. The effect upon the cerebral tissue was precisely the same in such effusions as in apoplexy. The surrounding texture was simply lacerated when the injury was quite recent; but if life was preserved for a few days, adventitious products were detected in the softened brain, in both instances.

The exceptions to this rule are, however, by no means few, where in apoplexy suddenly fatal, the brain is not only found softened, but also bearing marks of previous disease. Even under these circumstances, it might be doubted whether the effusion was the consequence of the diminished support afforded by the cerebral texture to the capillaries. This notion seems to have been formed upon theoretical grounds, rather than from the observation of facts. The portions of the brain most frequently the seat of apoplexy (the corpora striata and optic thalami) are often reduced to a pulp, without the occurrence of extravasation. There would even seem to be a natural process set up with the view of arresting this danger; for the diseased substance is frequently pale and anæmic, when the other parts are loaded with blood.

When these two affections are united in the same brain, they might possess a common pathology, and might both originate in disease of the capillaries.

Some facts recently published by Mr. Paget,* support this view. He found the vessels leading to apoplectic clots, in a state of fatty degeneration. The oil-granules had collected in them to such an extent as nearly to obliterate their tubes, and some of them were shrivelled and wasted. The fatty particles were, likewise, deposited in the surrounding substance, whose consistence was much diminished. Mr. Barlow found similar lesions in two cases of apoplexy; the vessels near the clot were loaded with fat-granules, and the surrounding texture softened.

The question naturally arises, which was the primary disease in these patients. In the following case there can be no doubt, both from the symptoms and the character of the lesions found after death, that the fatty deposition had occurred prior to the extravasation. The patient had been under the care of Dr. Powell and Mr. W. Lloyd, who kindly invited me to witness the dissection; and to the latter gentleman I am indebted for the detail of symptoms.

Mrs. Stacey, aged 71, had for some years evinced intellectual weakness. Her memory failed her, and she was often unable to remember the most familiar circumstances. There were also considerable debility, and frequent tremblings of the limbs, almost amounting to paralysis agitans. These symptoms were very mnch aggravated by an attack of bronchitis, from which her recovery was extremely slow; the prostration was now complete, the pulse feeble; the memory was almost entirely lost; the sight was dim, and she complained of cold sensations, like the trickling of water down the limbs. In June last, Mr. Lloyd says he was summoned to the patient hastily, and found her totally insensible, with stertorous breathing, and paralysis of the left side. The usual remedies were employed, but she gradually sunk and died on the fifth day, having had no return of consciousness.

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* Medical Gazette, 1850.

Inspection.—The dura mater adhered firmly to the arachnoid at several points. The latter membrane had almost universally a cloudy aspect. There was considerable vascularity of the membranes and convolutions, and to a minor degree of the central parts of the brain. The healthy consistence of the organ was preserved, except in a portion adjacent and external to the right lateral ventricle. At this point a clot had formed which had burst into the adjoining cavity. The brain in contact with the clot, and for about an inch and a half beyond it, external to the ventricle, was of a pulpy softness. The parts in immediate connexion with the extravasation within the ventricle, were likewise softened.

Under the microscope, the clot exhibited minute fragments of nerve-tubes in the midst of innumerable blood-corpuscles. The pulpy substance, beyond the ventricular parietes, was loaded with large oil-globules, every portion which was examined containing them in abundance; but the softened parts within the ventricles were free from fatty matter, consisting only of comminuted nervous structure and a few exudation-corpuscles. No diseased vessel could be detected.

The symptoms in this patient prior to the apoplectic seizure were most probably occasioned by the presence of the fatty particles, and their effects on the tissue of the brain. This morbid change extended beyond the point where it could be supposed to be influenced by the extravasation, and was doubtless anterior in origin. But within the ventricle where the blood had penetrated by lacerating the walls, a different state of things existed; no mark of old disease was presented there, and the softening was probably caused by the presence of the foreign matter giving rise to inflammation and its consequences.

Tumors and other morbid growths.—The structure of the brain is frequently disorganised when tumors, or other morbid growths, are affixed to its membranes, or imbedded within its substance. The softening, in these cases, may be either of the parts surrounding the foreign body, or in the central portions of the organ. But tumors often remain in the brain for a considerable period, without causing this accident.

Transformation of the softened tissue.—One of the most difficult points in the pathology of this lesion, is to trace the changes that it undergoes subsequent to its formation. It must be admitted that the facts bearing upon this question, are deficient both in number and precision; and great care is requisite in attempting to generalise these scanty materials.

Some useful hints on the subject might be gathered by observing what takes place in the nervous matter in and around apoplectic clots, at different stages of their existence. The brain is always broken down under such circumstances, either previously or subsequently to the effusion; and by marking the changes that its texture manifests at those points, it might not only be ascertained whether a reparative action is set up, but some insight into the physical characters by which it is announced, might likewise be obtained.

Shreds of nervous matter are included within all large extravasations; and even in those of less amount this is made apparent by the microscope. But when an opportunity is afforded of examining the clot at a later period, no trace of the cerebral texture is perceptible in the effusion. This circumstance affords conclusive evidence that the softened tissue can be completely removed by the absorbents. Some of the alterations in the substance around the clot, arise from the same action. The tissue, in those situations, is sometimes penetrated with numerous small holes; at others, the nervous matter almost entirely disappears, leaving in its place loose cellular membrane, containing a white chalky fluid. At a more advanced period, the morbid mass sometimes becomes dense and indurated, appearing, as Rokitanski observes, "like a cicatrix surrounding the apoplectic cyst."

Induration of the substance around a former extravasation, may also be produced by the density and abundance of the inflammatory exudations, when the texture assumes a smooth, shining appearance, and has a pearly whiteness.

In some instances, the substance at the points referred, to is merely softened; its color being mostly a shade of yellow, more or less distinct; and it may retain this tint, apparently, when the healthy consistence is restored. Andral found yellow softening surrounding an apoplectic cyst, seven months after the seizure. In a case of thirteen months' duration, there was pulpy softening, also of a yellow color. In another instance of two years' date, the yellowness remained, but the brain had regained its consistence.

These facts seem to justify the opinion, not only that a reparative process is set up by nature in this disease, but also that, under favorable circumstances, this purpose is actually accomplished. It is doubtful, however, whether the material is renovated by the deposition of nervous matter, or by means of the cellular tissue; but as the functions of the organ seem, in some cases, to be restored simultaneously with this action, it is reasonable to conclude that the natural tissue is in a great measure restored.

Yellow patches of the convolutions.—An appearance noticed by Cruveilheir, Dr. Sims, and others, and named by the former the yellow pellicle, is sometimes seen on the surface of the brain, marking the site of a peripheral or capillary apoplexy. This matter has a darkish yellow, or fawn-color, which Cruveilheir compares to that of chamois-leather. Its consistence varies; sometimes it is soft and pulpy, at others quite dense and membranous; a difference probably dependant upon the degree of plasticity in the effusions that had assisted in its formation. It is firmly attached to the substance of the brain, over a space of from one to two inches. At this spot the convolutions are wasted, and often quite obliterated; and upon removing the skull, the membranes over that point are observed to be loose and flaccid. In the vicinity, the substance is often softened.

The process leading to this formation is similar to that which occurs in ordinary apoplexy. The extravasated blood acts as an irritant on the cerebral tissue, causing it to inflame and soften. The inflammatory effusions mingle with the extravasated blood, and produce this membranous-like matter. The diseased tissue is afterwards absorbed, and the brain is consequently indented at that spot.

The appearances, supposed by Dr. Sims, Durand-Fardel, Dechambre, and others, to mark the site of former softening, bear a general resemblance to those now detailed. The principal of these are, cellular infiltration, porosity, induration, cysts.

Cellular Infiltration.—This term is applied by Durand-Fardel to a peculiar structure which, there is reason to believe, denotes a previous stage of softening. It is occasioned by the absorption of the diseased portions, and appears to be the same lesion as that just stated to be occasionally found in the vicinity of old apoplexies. When the nervous texture is completely removed, nothing but cellular membrane remains, in the meshes of which a chalky fluid accumulates. The cellular tissue itself, sometimes undergoes transformation, and is converted into a serous membrane, which arranges itself into a cyst-like form; at others, the whole diseased mass becomes indurated.

Porosity.—A remarkable appearance was observed by Cruveilhier, Dr. Sims, and several other pathologists, in the brains of patients, who had formerly suffered from symptoms of cerebral softening; and which is also met with, occasionally, in the parts around old clots.

The diseased portion, in these cases, is perforated with numerous small holes, that give it a worm-eaten appearance, which has been compared to that of porous cheese or new bread. It is most common in the corpora striata, but it is also found in the white substance. Little or no fluid is contained in those minute cavities. Rokitanski thinks that the lesion is the consequence of atrophy of the cerebral tissue; and that the porosity marks the spots, once occupied by vessels, since wasted and obliterated.

Induration.—Lallemand considers that a circumscribed induration in the cerebral substance is the result of previous softening. There can be no doubt that inflammatory softening, accompanied by an abundant plastic effusion, would have this effect. Induration, also, results from the further progress of cellular infiltration, and probably from other circumstances; but its existence cannot be regarded as decisive of prior softening.

Cysts.—The line of demarkation between the apoplectic cyst, and that occupying the site of softening, is but obscurely defined. There are, however, certain distinctive characters belonging to each, which, when present, might help to establish their identity.

A large sanguineous excavation will retain certain peculiarities that mark its origin, for a very considerable period after the extravasation. Even several years afterwards the remnants of a clot are to be traced. It might therefore be presumed, when, in comparatively recent seizures, no blood or fibrine exists within the cavity, that it had not originated in sanguineous apoplexy.

There are other cystic formations that are supposed, not without reason, to indicate the seat of former softening, and which, at least, could hardly have arisen from the presence of a clot. Thus, instead of fibrinous matter being included within the cyst, strips of cellular membrane stretch across the cavity and adhere to its inner parietes. The surrounding substance may have its natural consistence, but it is often indurated, and occasionally softened. The cavity appears to be obliterated, in some cases, by the gradual approach of its walls; and a cicatrix is formed, of a shining white color and striated, the lines converging to a common centre.

The various morbid structures now enumerated, cannot be regarded as representing different stages of the same lesion. Assuming it to be proved, that they each arise from some form of cerebral softening, it is most improbable that conditions, so different at their commencement, should, in their subsequent progress, lead to the same kind of alteration in the texture of the brain. Acute or chronic cephalitis, fatty degeneration or atrophy, for example, would so far have an action in common, as to effect the reduction of the cerebral matter; but beyond this, there can be little alliance between them. A much more minute analysis of these morbid processes will therefore be required before their nature can be thoroughly understood, or each lesion classed in the series of phenomena to which it belongs. It would also be very incorrect to imagine that all these alterations belong to a curative process. Some of them, doubtless, deserve that character; but others might rather be regarded as having retrograded still farther from the normal structure. In the fawn-coloured deposition, for instance, which Dr. Sims describes as occurring in various parts of the brain, no trace of organization is perceptible, but the mass is principally made up of fragmentary nervous tissue and blood-corpuscles.

Having advanced thus far in the enquiry, and stated the principal physical characters of this morbid product, there remain to be examined the various theories that have been advanced respecting its nature, and the arguments by which each of them is supported.

Inflammation.—The inflammatory character of the disease has always been ably advocated from its first announcement to the present time. Lallemand, Bouillaud, Durand-Fardel, Valleix, Gluge, Bennett, and many other distinguished pathologists, support this view.

It is unquestionable that one variety of the affection possesses an inflammatory nature; that it is a local or partial cephalitis. Every circumstance in its history leads to this conclusion. The mode of attack, symptoms, and morbid appearances, equally point to this origin. The softened tissue has its vessels distended with blood; it is red and swollen, and it contains the common products of inflammation, exudation-corpuscles, and sometimes pus-globules.

But some of the appearances which the older pathologists relied upon, in proof of the inflammatory character of the disease, were fallacious. The mere redness of the diseased portion, or the yellow pus-like aspect that it sometimes presents, has already been shewn to have no necessary connexion with inflammation; and the presence of undoubted marks of meningitis, whether old or recent, is not sufficient to establish the fact that the softening found associated with it, was the result of the same action.

The discovery of the exudation-corpuscles in the diseased tissue by Gluge and Dr. Bennett, must be allowed to be one of the most important facts that has been promulgated on this point of pathology; and it is by similar investigations that our knowledge of the disease must be mainly corrected and enlarged.

Gluge found the corpuscles in every instance of softening that had produced palsy; and he infers that the inflammatory variety alone can be regarded as the result of morbid action, the others being merely cadaveric. Exudation-granules were also found in the vessels leading to the affected part. The tissue was reduced to fragments, in the midst of which the corpuscles were deposited. He varied this enquiry by forcing pins into the brains of animals, and observing the effects upon the structure. Around these punctures it was broken down, and contained the corpuscles; in some of the experiments blood was infiltrated into the softened texture, imparting to it a red color.

Dr. Bennett's researches present this action in a still more important light. He found the exudation-granules coating the vessels of the diseased texture, or floating loose in it, and sometimes arranged in groups. He likewise observed the exudation-corpuscles with distinct cell-walls and nucleated. In 24 cases where softening of the brain was found, these appearances were present in 18; all of which had been attended by the peculiar symptoms of that affection; such as loss of consciousness, preceded or followed by dulness of intellect, contracture, rigidity of the extremities, and paralysis.

In 2 of the 6 cases of non-inflammatory softening, a large extravasation occupied one of the hemispheres. In 3, there was loss of consciousness and convulsions, but no paralysis or contracture; and the lesion found in the brain was capillary apoplexy. In 1, the substance was extensively softened, without containing the inflammatory exudations, and in this case there had been no cerebral symptoms.

Dr. Bennett ascribes the softening in 5 of these cases to mechanical injury, caused by the effusion of blood. In the last case, he supposes the diminished cohesion to be merely a post-mortem occurrence. The inflammatory and non-inflammatory varieties existed in different parts of the same brain in 4 cases, when it was found that all the former were accompanied by the signs of the disease, but the latter was not manifested by symptoms of any kind. One of those patients had left hemiplegia. Both corpora striata were softened, but the right only contained the corpuscles. The softening on the left side excited no symptoms. In another case the symptoms were, loss of speech, disorganization of the eye, and convulsions, but no palsy. Abscesses, surrounded by inflammatory softening, were found in one hemisphere. The central portions of the brain were also softened, but being free from exudation-corpuscles, no symptoms were produced.

Palsy of both arms, and contraction of the right, tetanic spasms of the muscles of the neck, were the symptoms in the third case. The pons Varolii was softened, and filled with corpuscles. The right corpus striatum was also softened, but free from the exudations; and no symptoms were found in connexion with it.

The fourth patient had suffered from headache, prominence of the eye-ball, and coma, but was not palsied. A fungoid tumor occupied the base of the orbit; there was an abscess in the anterior lobe, surrounded by inflammatory softening; there was also central softening that had been unattended by symptoms.

These very striking and interesting observations completely establish the identity of one form of cerebral softening with inflammation, and suggest many other important considerations. They would indeed lead to the conclusion that the inflammatory softening alone can properly be denominated morbid; but there are too many reasons for the contrary opinion to admit this doctrine in its full extent; and almost each day brings new proof that the disease embraces a wider pathology. The instances are so numerous of patients dying with symptoms of cerebral softening, in whose brains the lesion was found in accordance with the diagnosis, but free from all trace of exudation-corpuscles or granules, that it is impossible not to admit the existence of other forms, besides that which is strictly inflammatory. There appear to be some points requiring explanation even where these exudations exist. Sometimes, for example, the number of the exudation-corpuscles is so small, compared with the extent of the disease, that in a large mass of softening, only a very few can be detected after a long search. In the brain of a patient, who died of palsy, the septum lucidum and fornix were entirely diffluent; but after a prolonged and careful examination, conducted by Mr. Wharton Jones, only two corpuscles were seen. The vessels were not diseased.

Sometimes the corpuscles are crowded in one small isolated point, around which the structure, although extensively softened, is perfectly free from them. An example of this kind was also examined, with his usual kindness, by Mr. W. Jones. The patient had been subject to epilepsy, and latterly had become palsied and nearly idiotic. The septum lucidum was of diminished consistence; the posterior cerebral lobe was reduced to a pulp, involving the structure to the depth of more than an inch.

By the microscope, it was found that the softened portions, in the centre of the brain, were broken into fragments of different forms and sizes. Those at the base were also disorganized. In the former situation no exudation-corpuscles existed; and they could not be detected in the latter, except at one point near the surface, where they were crowded in great numbers, both in the texture, and adherent to the external coat of the vessels.

It can hardly be imagined that the minute specks, where the inflammatory exudations were deposited, were the only truly morbid structure in this great amount of softening, or that the whole disorganization was the consequence of a cephalitis so limited. Might not the inflammation itself, confined as it is in such instances to a point, be rather consecutive than primary, denoting a nisus by which Nature was about to attempt a curative process? for it is difficult to suppose that in a cephalitis of any extent the inflammatory products would be so scantily supplied.

Non-inflammatory softening.—There appear to be several varieties of non-inflammatory softening which it is essential to examine.

Fatty degeneration.—Fatty particles have been found in the brain under circumstances that are not always identical, some of which have been alluded to. The facts on this subject are full of interest, and promise to open new views of the nature of some obscure nervous affections.

The oily-matter may be confined to an insulated portion of the brain, or be distributed through the whole organ. It may occupy the vessels without being exuded into the substance, or be abundantly deposited in the latter, when no trace of it is found in the capillaries; or it may exist in the vessels and nervous texture at the same time.

For several of the following cases I am indebted to Dr. Diamond, who very kindly afforded me an opportunity of examining the brains of the patients.

The first patient was a female, who for several years was in a maniacal state, and had latterly been affected with general paralysis.

The membranes were adherent to the surface of the brain, especially over the left hemisphere near the sulcus. The brain generally was firm and healthy; the corpora striata were unusually pale; on a level, and external to the left lateral ventricle, the substance was much softened, to the extent of about two inches. Under the microscope the diseased structure appeared completely disorganised; but it contained no exudation-corpuscles. A vessel, in the softened portion, was filled with oily-matter, none of which could be detected in the substance of the organ. In this examination I had the able assistance of Dr. George Johnson.

The fatty matter sometimes occupies a large portion, or nearly the whole of the organ, when the texture is remarkably pale and flabby; the convolutions are nearly colorless; the medulla has a pale yellow or a light straw tint.

The two following cases are examples of the kind:—

A woman, aged 26, formerly a prostitute in a low neighbourhood, was addicted to intoxication to an extreme degree, which brought her in continual collision with the police authorities. Her mind at length became deranged, and she was placed in an asylum. When there, she was subject to frequent maniacal paroxysms. Latterly these had ceased, and she passed into a state of complete dementia and general paralysis.

Inspection.—The membranes were generally thickened, and adhered firmly to the convex surface of the brain. A small quantity of serum was collected in the ventricles and at the base. The substance of the organ was remarkably pale, loose, and flabby. The floor of the lateral ventricles, the optic thalami, septum lucidum, and fornix, were completely broken down; the other parts, within the ventricles, were diminished in consistence, but not diffluent.

The portions most softened were reduced to small fragments, in which all traces of organization were lost. Oil-globules were thickly deposited in this mass. Almost every portion of the brain contained these bodies more or less abundantly. Specimens from the surface, the corpora striata, the hemispheres, and even the medulla oblongata, were found impregnated with this fatty matter.

There was no disease apparent, either in the large cerebral vessels or in their capillaries; nor could any oil-globules be distinguished in them. Mr. Taunton assisted me in the examination of this brain, and of several others.

A woman, aged 42, who had been long subject to epilepsy, became at length entirely idiotic, in which state she died.

The dura mater was firmly adherent to the arachnoid, especially near the falx. The convolutions were of a light fawn-color, universally; the brain was slightly vascular; the septum lucidum and the optic thalami were of diminished consistence.

Oil-globules were found in the softened portions in abundance; they were also met with in the cortex; but they were not generally diffused throughout the substance.

A young woman, almost an idiot from her birth, was subject to epilepsy, and had lost the power of the lower extremities. She became a patient at the Surrey Asylum; her demeanour was very placid and quiet, and she seldom spoke other words than "Doctor, cure my fits." She died of lumbar abscess.

Inspection.—There was considerable vascularity of the membranes and surface of the brain, and the former had extensive adhesions evidently of long standing. The substance of the hemispheres, generally, was perfectly firm, and had a healthy appearance; the septum lucidum and fornix were in a diffluent state; the corpus callosum was much softened: the corpora striata and optic thalami were of slightly-diminished consistence. An immense number of large oil-globules filled the diffluent portions; they were also found in abundance in the portions less softened, and a few in other parts of the brain.

A woman, who was ten years in the Surrey Asylum, had been unable to leave her bed during the whole of that time from paralysis. She was liable to most violent attacks of mania.

Inspection.—The dura mater was strongly adherent to the skull; there was great vascularity of the surface and of nearly the whole substance of the brain; the corpora striata were of a much darker shade than usual. These bodies, as well as the optic thalami and septum lucidum, had a flabby doughy consistence, without being actually softened. At these points oily matter was deposited in a large amount.

The following interesting case was under the care of my friend, and former pupil, Mr. J. H. Buxton.

Rebecca Falkin, aged 58, complained of slight headache and giddiness, which had troubled her occasionally for about a month. On the 24th June last, she had an attack of partial stupor, not answering questions unless spoken loudly to, and then only in monosyllables. The pupils were sluggish and somewhat dilated; the pulse was slow and languid. She had great pain and a sense of weight in the head, and had vomited repeatedly on the previous days. On the 28th, she was much better, and able to converse and take food. She still complained of headache, but the sense of weight was gone. The attack was renewed on the following day, and again on the 5th and 12th July, partial recovery intervening. On the 12th, the coma returned, with stertorous breathing and complete hemiplegia. From this time she continued for several days, in a state of stupor, occasionally becoming quite comatose; and again so far recovering as to understand what was said to her, and to take sustenance. Sometimes, she talked in a rambling strain; at others, she was more collected. From the 26th, she was free from those relapses into a state of coma until the 5th August, when she had another seizure. She died exhausted on the 11th.

Inspection.—The corpus striatum and optic thalamus, the floor of the left lateral ventricle, and the portions between it and the base of the brain were completely softened; the right hemisphere and cerebellum were healthy. The diseased cortex, over a space of above two inches, had a fawn-color and a pulpy consistence; beneath this, the medulla was also much softened, but it retained its normal hue; external to this again was a net work of deeply-injected vessels, which were lost as they approached the seat of softening.

The yellow portions consisted entirely of broken nervous tissue and blood-corpuscles to an enormous amount. Close upon its margin a few exudation-corpuscles were perceived. In the white softening, oil-globules of a large size, and in great numbers, were deposited. The substance in which vessels were crowded was free from adventitious matter.

These cases, with the facts previously obtained, make it probable that fatty degeneration of the cerebral substance is of frequent occurrence, and is intimately allied with one form of cerebral softening. The pathological states under which it is found are not, however, always alike.

Sometimes it appears to be the consequence of some local action or irritation. Thus, it is observed commonly under circumstances that might be supposed to impair the nutrition of the organ, or impart to it a feeble vitality. In most of the examples cited, chronic meningitis and adhesion of the membranes had evidently preceded the deposition of oily matter; and in others, the patient had been long subject to frequent and violent paroxysms of mania.

But the fatty degeneration may be only a portion of a constitutional malady, the brain undergoing this morbid change, together with other organs, principally so far as has been ascertained with a similar lesion of the heart. Dr. Semple mentions an instance where oil-globules were found in the brain, and the kidneys had undergone granular degeneration. This appears not to be a common occurrence, probably because the kidney-disease usually originates in local irritation of the organ, and not from a general cause.

It will, I think, admit of doubt whether the cerebral vessels are necessarily diseased in this condition of the brain. In the majority of my cases they appeared healthy. In one instance a small capillary was shrivelled and wasted. In a second, oil-granules nearly filled the vascular tube; in another, a large oil-globule or two, exactly resembling those exuded into the substance of the brain, were seen by Mr. Taunton and myself, in a vessel which otherwise presented no diseased appearance. In this state of the cerebral circulation, softening might occur either in consequence of the diminished supply of blood to the texture, or from the escape of the fatty matter from the vessels. But when the whole, or the greater portion of the organ exhibits more or less of this transformation, and more particularly when it is manifested at the same time in other organs, it must have an origin independent of disease of the cerebral arteries; and this circumstance, and the frequent appearance of the oil-globules when no lesion of the vessels can be discovered, seem to warrant the opinion that vascular derangement is not a necessary element in its production.

The existence of fatty degeneration in the cerebral texture does not necessarily imply that it is reduced to fragmentary softening, although some portion of the organ is mostly found in fatal cases to have undergone this change. Where the fatty particles are deposited largely, the brain has a doughy consistence; there is scarcely any distinction of color between its cortical and medullary portions; the dark hue of the former is nearly obliterated, and the white substance takes a sickly yellow aspect.

In this condition of the organ its functions are seriously impaired; when the disease is limited to a single hemisphere, the limbs on the opposite side are weak and tremulous, the memory failing, and the intellect enfeebled. But this cause is most strikingly perceived in the general palsy which frequently closes the career of insane patients. The whole phenomena of this remarkable affection denote some morbid change involving a large extent of the cerebral structure; for the mind dwindles in proportion as the extremities lose the power of voluntary motion. In some of the cases of this affection now given, this state of the brain was found. In one of these, no portion of the brain was actually disorganized, but it was filled with the fatty material; and there seems reason to conclude that one form of general palsy, and also other affections in which the cerebral functions undergo a gradual decay, are associated with this morbid state.

Obstruction of the Cerebral Vessels.—Softening of the brain may arise from mechanical obstruction of the vessels conveying blood to the organ.

Several cases are recorded in which the symptoms followed immediately on the application of a ligature to the carotid, by which the current of blood was arrested in a portion of the cerebral vessels. An instance of this kind I had once an opportunity of witnessing. An elderly man had a large hard tumor under the jaw, which was the source of pain and inconvenience. Other means proving unavailing, the carotid artery was tied; a few days afterwards the patient become hemiplegic and died. Pale softening of the brain was found occupying the hemisphere on the same side as the ligature, and opposite to that of the palsy.

Similar cases were observed by Mr. Abernethy,[*] Sir Astley Cooper,[†] Mr. Vincent,[‡] Sedillot,[‖] and others, all of which agree in their general characters.

To the same class belong those cases in which the cerebral circulation is impeded from ossification or plugging of the vessels. Dr. Carswell found the arteries of the brain ossified, or otherwise diseased, in the majority of the patients who died of softening of the brain at the Salpietriere, where, it should be recollected, however, that the inmates are chiefly aged females. Hasse[§] collected several examples of the same kind, where obliteration of the vessels going to the lesion had occurred either from bony or fibrous deposition within the vessels.

A very instructive example of this kind, detailed by Dr. Todd,[¶] affords a complete illustration of this variety of the disease. In this patient the carotid artery was rendered impervious from a dissecting aneurism. Among other accidents arising from this condition was hemiplegia of the opposite side.

The right side of the brain was pale and exsanguineous. The centrum ovale on that side "presented the appearance as if it had been worm-eaten in patches. Each patch was from half an inch to an inch in diameter. It had the same color as the surrounding brain-substance, but was evidently diminished in consistence." These patches were perfectly free from admixture with all foreign material.

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[*] Surgical Observations, 1804.

[†] Medico-Chirurgical Transactions, vol. 1.

[‡] Medico-Chirurgical Transactions, vol. 29.

[‖] Dr. R. Bennett's Progress of Pathology and Practical Medicine. British and Foreign Medical Review, vol. 20.

[§] Archives Générales, 1847.

[¶] Medico-Chirurgical Transactions, vol. 27.

These facts appear fully to sustain the original opinion of Rostan and Abercrombie, that the affection is occasionally produced from a failure of nutrition in a portion of the brain. But there is no reason for admitting with them that it is analogous to the gangrene that attacks the extremities of old people; for the diseased tissue is free from the odour of gangrene, and from some other of its properties.

These cases are not only valuable as illustrating the effects of cutting off the supply of blood from the brain, but they likewise point to a class of causes acting in the same manner, but less obviously, and to which reference has already been made. In the disturbance to the cerebral circulation, from obstructive lesions of the heart, for example, softening seems to be induced in this manner; a region of the brain being repeatedly deprived of a portion of its blood, its nutrition is at length interfered with.

This kind of action is sometimes exhibited in the morbid appearances. The softened structure is perfectly anæmic, when the rest of the organ has its normal quantity of blood, or is even congested. In three brains that I lately examined, this arrangement was presented very remarkably. In one, the softening was in the cerebellum, in the others, it occupied one of the hemispheres. The organ in each case was very much congested, except the diseased portion itself. Around the latter, the vessels were arranged so as almost to form a circle; they were prominent and greatly distended with blood, which, however, did not penetrate the softened texture, having been apparently arrested on its approaching that boundary. This arrangement was perfectly visible to the naked eye, the vessels presenting an appearance not unlike those of the mesentery. Upon mentioning this circumstance to Mr. Wharton Jones, I was gratified to learn that he had observed and described a similar arrangement of vessels surrounding gangrenous spots. He believes that in this manner mortification of a tissue might be effected, by the withdrawal of its nutritive fluid independent of inflammatory action.*

Whether in the cases now referred to the softening was anterior or subsequent to the arrest of the circulation through its substance, is uncertain; but the products of inflammation were absent in the softened structure; the fibres were merely wasted and reduced to fragments in two of the cases. In the other, the softened portions contained oil-globules. There was no evident disease of the vessels.

Chemistry of Softening.—The chemical changes that the brain undergoes in softening are not known, and scarcely an attempt has been made to ascertain the facts on this subject. The only theory of this kind yet put forward is that of Courbet, which can merely be regarded as suggestive, not being sustained by actual experiment. He finds that two of the constituents of the brain, eleencephol and cephalot, are isometrical in composition; and he supposes that the former is capable of dissolving the other cerebral elements. By the conversion of cephalot into eleencephol, therefore, the more solid parts are reduced in consistence, and softening induced.

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* On the state of the Blood and Blood-vessels in Inflammation.—Guy's Hospital Reports, vol. vii. book 1, page 50.

This explanation, at least in its present shape, is far from satisfactory; nor is it probable that the chemical change is alike in all cases of softening. The condition of the blood, as well as the alteration in the chemical properties of the diseased structure should be learned to obtain more correct views on the nature of the morbid change, but, at present, the whole question is in far too much obscurity to admit of general deduction.

Spurious Softening.—While it is necessary to be cautious in the admission of spurious softening as a morbid condition, there is at least an equal necessity of care in setting aside true disease upon insufficient grounds; and I believe that, at present, the disposition is rather to be over-sceptical on this point than otherwise. When in a brain, otherwise healthy, one portion has its structure disorganised at a spot which accords with the supposed seat of the disease, as suggested by the symptoms, it surely is no great stretch of credulity to regard it as morbid, although it is free from either exudation-corpuscles or oil-globules. Neither can those cases where the whole organ is soft and flabby be set aside as spurious, without examination; for the tissue may be reduced to this condition during life in consequence of œdema or oily-accumulations. The brain in an advanced state of putridity has the peculiar odour that belongs to that condition; it acquires a dark color and a glossy appearance after a short exposure, and, when once commenced, the putrefaction soon involves the whole structure, whilst morbid softening preserves its insulated character for a longer period. In some cases, however, it must be admitted that the distinction is not easily made.

The facts now advanced respecting the pathology of softening of the brain seem to admit of no other opinion than that there are several morbid processes capable of inducing the disease. Between these there is but little in common, except that they all tend to the final destruction of the tissue affected. The conclusion, therefore, must be, that softening of the brain is not a lesion whose existence at once reveals the morbid condition that had produced it, but that it represents very different and even opposite pathological states. Thus, it may be the result of inflammation, or of inanition, of hyperœmia, or anæmia, of a failure of nutrition, either general or local, of fatty degeneration of the organ, of its infiltration with serum, and probably of some modification of the elements of which the organ is composed.

There are some facts that suggest the opinion that the lesion may originate in functional disturbance of the nervous system itself. Thus, it undoubtedly commences sometimes after violent mental agitation, or some shock to the feelings, as sudden fright, or grief. It likewise arises not unfrequently from despondency, or deep and lasting disappointment of cherished hopes. The agency of the nervous system is still more obviously displayed where the signs of softening supervene upon an injury to the nerve. The local disturbance arising from such accidents, sometimes gives place to a wider range of symptoms which terminate in hemiplegia and disease in the opposite cerebral hemisphere. Whether in these instances the change is effected by the immediate agency of the nervous system may, however, be doubtful: the more probable explanation is, that it is accomplished through the influence which that system exercises over the vascular.

Prior disease existing within the cranium might act in a similar manner in the causation of softening. It has been shewn, for example, that the structure is frequently destroyed where there was some long-existing affection of the membranes. The brain breaks down under this kind of irritation, not generally in the parts immediately in contact with the diseased membrane, but, more commonly in its central portions. In many of these cases, the lesion is free from foreign products, the texture being merely broken into fragments.

It is very interesting to observe the gradual alteration in the character of the symptoms as the substance of the brain begins to partake of the diseased action. The wildness, delirium and excitement, or even occasional brilliancy of intellect that marked the epoch of membranous irritation disappear, and in their place, there are the dulness of comprehension, obtuseness of thought, the stupor, somnolency, and drivelling characteristic of softening.

In the early stages, and before the destruction of the cerebral structure is much advanced, those signs dependent upon what might be styled radiation, are manifested. Severe headache, vomiting, pains or contracture of the extremities are among the most remarkable of these symptoms. In other instances, some insane idea becomes indelibly fixed in the mind, or but one unvarying phrase can be formed on the tongue. In the fits of more determined stupor, when the brain is deeply oppressed, and the disease cannot send forth radiations, the pain, contracture, vomiting, and the other symptoms dependent upon them, are therefore suspended. It is curious to observe when this oppression is temporarily relieved, how the same set of signs again recur, preserving still their former character. The lesion of sensation or movement, the insane idea, the endlessly-recurring words are again renewed.

In advanced softening these radiations finally cease; the disease is confined within its own boundaries, and all communication between it and the rest of the brain is finally cut off. It is to such want of consonance between the different regions of the organ that some of the specific signs of softening are probably due. There is evidence that the process of thought is sometimes completed, and the mind capable of judging correctly, although the power of expression is gone; and, even in more advanced cases, when the patient lies in a semi-comatose state, he sometimes seems to labour to give utterance to his feelings, and on his failing to accomplish this desire, an expression of disappointment or rage forms on the countenance. But the confirmed disease is often accompanied by entire insensibility to external impressions, and destruction of the reasoning powers. The memory, affections, and feelings are annihilated. Even old and confirmed habits and associations are suspended, and the most familiar circumstances fail to be suggestive of the train of thought that in the healthy state they had been long accustomed to recall.

Duration.—The disorder frequently advances so silently through its early stages that it is difficult to mark the period of its accession, and consequently to determine its duration. Rostan says, that when the malady is completely formed, or when palsy has commenced, the subsequent progress is usually rapid, death occurring from the second or third day to the second or third month. He found the acute form much more common than the chronic.

According to Lallemand, 41 cases, where the period of invasion was ascertained with some degree of accuracy, terminated—22 in the first, 12 in the second, and 7 in the third week.

Andral collected the histories of 105 patients, who had well-marked symptoms of the disease. He found that after the first month, only 16 of these remained alive, 10 after the second, and but 7 after the third. 2 patients lived for three years.

Durand-Fardel states, that 25 of 27 patients died before the tenth day; 1 lived to the twentieth, and 1 to the thirtieth day.

These results exhibit far greater activity in the disease than accords with my experience. That it sometimes runs its course rapidly is unquestionable; but life is often prolonged to a considerable period, and the chronic cases not unfrequently extend over a period of several years.

Terminations.—In cephalitis the termination by resolution might be effected by prompt and energetic treatment, and even when the disease has advanced another stage and the cerebral texture is disorganized, and the inflammatory products exuded, it is possible, under favorable circumstances, for a cure to be accomplished. This process, requiring a certain amount of vascular vigor, is much more likely to take place in the inflammatory softening than in that occasioned by a deficient supply of nutritious fluid.

Death may be caused by the failure of function in the brain itself; or some other organ might become secondarily affected. The fatal event is, however, often the result of debility, the patient sinking gradually into an adynamic condition, and dying with symptoms like those of typhus.

In 70 fatal cases, taken from various sources, the death was comatose in as many as 40, either from a sudden apoplectic seizure, or by stupor gradually increasing to perfect coma. In 6 of these cases the death was sudden; the patients, when in their usual state of health, were taken off unexpectedly without any sign of their approaching end, or were found dead, no danger having been immediately apprehended. In 13, the death was apparently from inanition, the strength failing, the vital power sinking, without the intervention of stupor, coma, or other violent symptom, life ending without a struggle; 3 patients died in an epileptic paroxysm.

The immediate cause of death is sometimes attributable to the setting in of pectoral disorders. "One organ alone," Andral observes, "appears to receive the direct influence of the cerebral lesion; this organ is the lung. We have been struck, in our dissections, with the very considerable serous engorgement of which it is frequently the seat, and it is by the lungs that death takes place in a certain number of individuals labouring under softening of the brain."

The form of pectoral disease, in these cases, is not always alike. Sometimes it is a simple bronchorrhœa; large quantities of white, frothy mucus, free from adhesive properties, being expectorated. In others, there is an extensive bronchitis. More commonly, however, this complication assumes the form either of pulmonary congestion or pneumonia. The pectoral symptoms, in this condition of the system, are usually but feebly developed, and the affection advances almost insidiously or even latently. The breathing, however, although not urgent, may be observed to be embarrassed, and the number of respirations increased. The countenance is anxious, the lips of a blue tint, the eyes rather prominent; the alæ nasi move with the respiratory actions. There is usually some cough and scanty expectoration.

In this state, with the brain diseased and the lungs oppressed, the patient passes rapidly into the typhoid state; the tongue becomes dry, parched, and covered with sordes; the countenance is collapsed; the pulse small and rapid; a cold sweat breaks out on the surface; and in this manner death comes on.

Diagnosis.—One of the most important questions in the diagnosis of this affection is the means of distinguishing the coma of apoplectic softening from that of sanguineous effusion. The solution should be sought in the previous history of the case, as well as in the characters of the seizure itself. In a certain number of cases of cerebral apoplexy, the texture of the brain is partially softened prior to the sanguineous effusion, and under those circumstances the symptoms of that condition might be expected to precede the attack; but, in general, the threatenings of apoplexy are sufficiently distinctive from those denoting the slow disintegration of the cerebral tissue. This will be best seen by reference to a sufficient number of cases, when it will appear, I think, that several indications, usually enumerated among the precursors of sanguineous effusions, are referrable to cerebral softening.

The following summary of 20 examples of each of those affections in which no evident complication existed, may help to decide the nature of their preliminary symptoms.

In 17 out of 20 cases, where a clot was found after death, the attack was entirely without warning. In the remaining 3 cases, the precursory signs of the fit were, headache, vomiting, vertigo, loss of recollection, drowsiness, and, in one instance, convulsions.

In the 20 cases of softening, the comatose seizure was without precursory signs in 2 only. In 16 of the remaining 18, headache was a prominent symptom before the attack It generally came on severely, either a few hours, or sometimes several days, before the appearance of more decided symptoms. The motor functions were impaired prior to the comatose attack in 12. In 5, the palsy was ingravescent, gradually increasing from a slight feebleness of the limb, to paralysis more or less complete.

In 13, the intellectual functions were disordered in some degree very early in the disease. In 7, some symptoms connected with speech or the articulation were observed before the apoplectic seizure.

The above details justify the opinion that, in the majority of instances, the diagnosis might be made with some confidence. When the attacks are quite sudden, or without evident warning, the probability is great that the case is sanguineous apoplexy. Headache and giddiness are common to both affections, at their commencement; but in softening, the subsequent course is more characteristic. The dulness of comprehension, vacancy of expression, forgetfulness, especially in regard to language, hemiplegic threatenings leading to an apoplectic seizure, sufficiently indicate the nature of the cerebral lesion.

The paroxysm itself does not supply any signs worthy of reliance upon which to found a diagnosis. During the actual struggle, the characters are precisely alike, in both diseases; but much insight is obtained into the pathology by attending to the subsequent progress of the case.

The transitory character of the coma, its sudden termination and frequent repetition, in this respect approaching the epileptic paroxysm, indicate softening.

There are certain symptoms remaining after the fit which might likewise help the diagnosis. Most of these have been already spoken of—such as, contracture of the palsied limbs, failure of the memory of words, and other signs.

Recamier supposes, that when the sensibility of the palsied limbs is exalted, and they are the seat of severe pain, softening is indicated. But this point is not to be taken as an infallible guide; for the palsied extremity commonly becomes painful when a clot exists, usually commencing some time after the attack, and probably depending upon a curative process going on in the brain.

It has also been maintained by some, that when the sensation is retained in the paralytic limb, the disease is softening, and not apoplexy. This opinion is sufficiently improbable in itself, and it is shewn to be entirely fallacious when tested by facts. It has been proved by Durand-Fardel that this condition of the sensory functions is observed in nearly equal proportions in both forms of palsy.

Another question of great importance connected with diagnosis, refers to the means of distinguishing inflammatory from non-inflammatory softening. It is at the commencement of the attack that it is mainly important to mark these diagnostic symptoms.

The inflammatory softening, at least when it occupies the central portion of the brain, is not commonly attended by marked febrile excitement. Occasionally the pulse may be a little quicker and fuller, and the heat of surface increased, but these symptoms are not sufficiently developed in the majority of cases to render them of value in diagnosis.

The attack, however, in the inflammatory variety is mostly abrupt. Severe headache, with occasional lancinating pain darting through the centre of the brain, vertigo, vomiting, and great confusion of thought, mark this epoch. The patient feels apprehensive that his senses are departing, and is eager for immediate relief; he is conscious of the danger of the process going on within the brain, a circumstance not observed in the non-inflammatory kind, when the patient is often indifferent to his early symptoms, which cause more anxiety to his friends than to himself.

The age of the patient and the condition of the heart would supply some valuable hints on the character of the cerebral lesion. In aged persons anæmia or fatty degeneration of the brain might be suspected to exist; which would receive additional probability, if the arcus senilis were largely developed, and the signs were present denoting softening of the central organ of the circulation; but, in young patients without these complications, in whom the cerebral symptoms appeared abruptly, inflammation is indicated.

Prognosis.—The prognosis of cerebral softening must, notwithstanding the proofs of its curability, be always unfavorable. When its symptoms appear in persons long the subjects of chronic disease, especially within the cranium, they commonly mark approaching dissolution. Thus in insanity, the commencement of general paralysis is well known, by those most conversant with that malady, to announce its final stage. The same remark equally applies to the cases of palsy which attack those debilitated by the long endurance of some organic lesion. The probability is, under these circumstances, that the softening process is secondary, and can be regarded only as a part of a constitutional malady.

When the early signs of inflammatory softening present themselves and are met by appropriate treatment, the prognosis will depend upon the age and strength of the patient, and his capability of undergoing the necessary treatment. Many of these cases recover completely, the brain being restored to its integrity without any trace of disease. The prognosis may be hopeful too, in some degree, when the symptoms approach gradually, or come on after inordinate mental excitement or anxiety; for many are completely restored to health, after rest to the wearied mind, or by soothing the distressed feelings.

The prognosis must be unfavorable so far, at least, as to complete recovery, when the disease has advanced to the second stage, and the cerebral structure is actually comminuted. The opinion now must be regulated by the prior history of the attack; whether it was dependent upon some accidental circumstances, or upon a condition which is not capable of removal. Seldom, however, under the most happy auspices, is the cure complete. The palsy may be recovered from in a great measure, but some weakness still affects the limbs. The mind may regain its power to a great extent, but there is still some defect of memory, or an incapability of any extraordinary intellectual exertion,—something, that continually brings with it reminiscences of the disease and its consequences.

These patients seldom attain old age. Without any fresh seizure, or even without any increase or change of the original lesion, the vital powers fail as years advance. The final catastrophe is brought about as has already been noticed, either by the supervention of other disease, especially of the lungs, or the patient sinks into an adynamic state, or dies in an apoplectic seizure.

Treatment.—If the views respecting the pathology of the disease, which have been adopted in these pages, are correct, the practical deduction suggested by them must be, that softening of the brain cannot with safety be treated upon any uniform plan. Those who regard it to be almost essentially inflammatory, are, of course, decided upon the class of remedies to be employed; but, the question will be far more difficult and complex when it is admitted that there are several morbid actions which lead to this lesion, and that the management must be varied with the form of the disorder.

But, whatever may be the character of the disease, its treatment may be considered under three heads:

1. That belonging to the precursory stage.
2. That necessary at the accession.
3. That suitable to the confirmed disease.

1. In the first stage, when the approaches of the malady are apparent, the most important indication consists in giving rest to the oppressed organ. This rule is equally applicable to all its forms, and unless strictly carried out, little good can be expected from any medical appliances. Whatever has acted injuriously on the brain should be instantly withdrawn. When the mind is overwrought by the toils and anxieties of business, by over study, or by excitement, or is worn down by the monotony of a daily avocation

with its constantly-recurring thoughts and cares, the warnings of danger should not be neglected.

The first great object is to obtain rest for the wearied organ by a cessation from mental labour, by change of scene, and especially by travelling, or by other means which might amuse the mind and open a new train of thought and feeling. This plan ought at any sacrifice to be carried out to its fullest extent. When the first signs of the coming evil appear, half-measures are of no avail: the patient should be earnestly advised of the utter hopelessness of battling with his disease; a prompt and judicious retreat can alone save him, and if he come to this determination sufficiently early, his health may be entirely restored.

The withdrawal of all other exciting causes should be equally prompt. Indiscretions in diet, the abuse of stimulants, late hours, insufficient sleep, excessive bodily exertion, superabundant discharges, require attention, and the patient should, by continual attention to such matters, be placed in circumstances favourable to the restoration of health.

The necessity of venesection at this preliminary period can but seldom occur; but a patient of a plethoric habit, with a full strong pulse, might be placed in less danger by taking blood from the system. When the symptoms of cerebral congestion exist, cupping between the shoulders, or leeching the temples, will give relief. But, in general, it is sufficient to administer a sharp purge, and enjoin rest and low diet, which will usually have the effect of lessening the cerebral oppression.

But many patients require a totally opposite management. They are worn out either by age, disease, or deprivation. All depleting remedies are worse than useless. The object of treatment is to fill the veins with healthy blood; nourishing diet, therefore, and even a moderate allowance of wine or beer, might be required, with some tonic medicine.

2. When the second stage has come on, it is still essential to look to the aspects of the disease in selecting the remedies.

If the symptoms denoting cerebral congestion or active inflammation exist, such as headache, heat of scalp, delirium, vomiting, a full accelerated pulse, heat of skin, thirst, and hemiplegic warnings, bleeding is certainly indicated. But, even then, much wariness is required. With a vigorous patient, and the opportunity of treating him at the first onset of the attack, the practice may be safely and judiciously adopted. But these circumstances are not usually met with in this affection. In general, the strength has already been prostrated either by anterior disease, or by long-continued mental labour and anxiety, or by deprivation. Moreover, there is something in the disease itself, when it has fully established its grasp, which forbids large depletion, for the patient wastes with extraordinary rapidity under its action, and soon falls into a collapsed state. Large bleedings are therefore, as a general rule, only admissible in the beginning of the case.

Local bleeding will often answer the purpose better than venesection, for there is often no excitement of the pulse, or other marked febrile symptom, even in inflammatory softening. By cupping between the shoulders or over the temples, the oppressed organ is often sensibly relieved, and the headache, confusion, the dreadful feeling of apprehension, and the other symptoms, are instantly lessened or removed. In less acute cases, the same advantages might be gained by the application of leeches.

The other means of subduing local action may likewise be employed, such as cold applications to the head, blistering the nape or the shaven scalp, mustard poultices to the extremities, or other derivants.

But it certainly would be a serious mistake to adopt such energetic practice in all cases in which the symptoms of cerebral softening are presented. The brain, instead of being overloaded with blood, is often in precisely the opposite condition; and the disease is associated with, if not dependent upon, a diminished supply of nutritious fluid. To withdraw large quantities of blood from the system under these circumstances, would be to adopt the most powerful means that could possibly be devised of hastening the progress of the disorder, while the topical bleeding would be but pursuing the same course to a minor degree.

It is especially necessary to be guarded in the use of the lancet in the apoplectic accessions that sometimes are among the earliest symptoms, and which commonly chequer the subsequent progress of the malady. The character of those seizures might induce the practitioner to draw blood from the veins. Seldom, however, will this practice be found of any avail. The comatose symptoms are not often relieved by it, and I have more than once observed the worst consequences when this treatment had been energetically employed.

The propriety of adopting this method of cure should be determined by other indications besides the existence of the coma. When there are signs of cerebral congestion or inflammation, the bleeding is of course indicated; but when the apoplectic seizure appears in debilitated, worn-out individuals of advanced age—when the pulse is weak and faltering, the surface pale and cold, neither the apparent urgency of the attack, nor any theoretical notion as to its nature, could justify the abstraction of blood.

Mercury.—The indiscriminate employment of mercury in these cases is equally to be avoided: but where the symptoms indicate inflammatory disease, its utility has been generally attested. A calomel purge given in the first instance might be followed by smaller doses of the remedy frequently repeated, or by the blue pill similarly administered, until moderate ptyalism is induced. But in feeble and aged subjects, the bi-chloride of mercury is a safer and more certain medicine, and it has the advantage of suiting those cases where some hesitation is felt in bringing on the full mercurial action. In doses of the twelfth of a grain twice or thrice a day, it often acts advantageously without occasioning salivation or other sensible effect.

But the instances are not rare where the contrary procedure is required, and although the advances of the disease are unequivocally presented, the whole attention must be given to sustain the failing strength. Quinine, ammonia, wine, and a generous diet, are now necessarily resorted to, however ill suited they might appear to the supposed pathology of the affection, and often the assurance of their efficacy is obtained by the improvement in the cerebral symptoms that follows their administration. The plan may sometimes be advantageously combined with the employment of counter-irritants to the head or nape, with the view of diminishing local action.

3. The management of the confirmed disease, when the mind is shattered, and the limbs palsied, requires discrimination. Even at this period the state of the patient may be much alleviated, the further progress of the disease arrested, and the injured functions perhaps, in a great measure, restored by judicious treatment. The objects to be kept in view are, to lessen the pressure on the diseased organ, and to forward any curative intentions that might arise. Heroic remedies would now be entirely misplaced, and those are best adapted for the purpose which act as alteratives, improving the general health, and giving tone to the capillary system.

The bi-chloride of mercury is an excellent remedy at this stage of the disorder. Given in conjunction with a tonic, it produces increased vigor both of the vascular and muscular systems. After taking it for a short time the patient frequently experiences more self-confidence, and is able to bear greater exertion both of mind and body; and in recent cases the palsied limbs may regain their power either partially or completely.

Iodine.—I have seldom seen any decided benefit from iodine or its preparations, in this affection. In whatever form or dose they were prescribed, they generally appeared to cause headache and giddiness, and if persisted in, more alarming consequences. Sometimes the patients, without any warning symptoms, were attacked with giddiness and stupor which necessitated the immediate withdrawal of the medicine, and the employment of means to counteract its effects. The iodine and iodides have, however, been found beneficial in the asthenic form of palsy, by some experienced physicians. Dr. Copland observed good effects from one grain of iodide of potassium, in the twenty-four hours, combined with liquor-potassæ and sarsaparilla.

Arsenic.—The preparations of arsenic have a well-known influence in some nervous affections. For several years I have been in the habit of prescribing the liquor arsenicalis in the palsy and other conditions depending upon softening of the brain. It is best suited to the chronic form, or, at least, to that in which all activity and excitement have ceased, and where the vital energy is deficient. In such cases, this remedy is frequently of much benefit, and appears to give renewed strength and firmness to the nervous system. It even seems to possess a curative property in this complaint; in several instances I have observed permanent improvement follow its administration; and, in two patients, the cure was almost complete.

Iodo-Arsenite of Mercury, Donovan's Solution.—In the few cases of softening in which I prescribed this powerful remedy, its effects were invariably the same. Sooner or later the patients complained of headache and giddiness, and a sensation of worry and excitement that obliged them to discontinue the medicine. It seemed, occasionally, in other respects, to have an advantageous action.

Iron.—The frequent alliance of the disease with anæmia or fatty degeneration of the brain or other organs, suggests the employment of remedies that have a tendency to improve the condition of the blood, by making it richer in fibrine and red particles. For this purpose, the preparations of iron seem to be especially indicated. With the view of ascertaining their value, in these circumstances, the sulphas ferri, or the vinum ferri was given to several patients. In two cases of recent hemiplegia, in old and debilitated patients, the symptoms gradually improved under the remedy, until voluntary motion was restored. Several old paralytic patients, with mental infirmity, also improved in some degree, but the medicine subsequently lost its power; and in some, to whom, at first, it appeared of service, it was afterwards injurious; others could not bear the remedy in any form or dose.

Other tonic remedies might sometimes be advantageously substituted for the ferruginous medicines—quinine, zinc, the mineral acids, the sulphuric or the nitro-hydrochloric in a bitter infusion, or similar medicines.

Opiates.—There are circumstances which not only warrant the administration of an opiate, but where considerable relief is derived from this class of medicines. It must be confessed, however, that the cases are not easy to discriminate, where the practice would be beneficial or otherwise. Singular as it might appear, the remedy seems to be most appropriate to the cases where the cerebral structure is extensively disorganized. Sometimes, when stupor or coma is threatened, a small dose of morphine, or a few grains of Dover's powder, will ward off the attack. At an early stage of the disease opiates are generally injurious, causing an aggravation of the symptoms that might continue for several days. Where it seems desirable to prescribe this remedy, the better plan is to order it in small doses at first, until its effects in the individual case are ascertained.

Phosphorus, nitrate of silver, and strychnine, have been recommended in this affection. The latter remedy I have often given; but it appears to be of no avail in the hemiplegia caused by softening or other organic cerebral disease. Numerous other medicines have been employed in the disease, or in the affections to which it gives rise, but these it would be needless to enumerate.

The introduction of setons or issues in the nape or arm is a practice that requires some discrimination. In chronic inflammatory softening, and in the latter stages of the acute disease, these remedies are undoubtedly useful. But in the forms of the disorder, allied with an exhausted condition of the system, their employment would be exceedingly pernicious; for they would then act in concert with the disease in hastening the destruction of the affected organ.

In old cases, where all hope of any considerable amendment is past, but little treatment is required so long as the complaint remains passive. An occasional aperient or tonic, with strict attention to diet and regimen, are alone necessary. But these patients seldom go on long without an accession of some kind demanding medical interference. Sometimes, the signs of cerebral congestion appear; when the rule should certainly be to avoid depletion as much as possible. Low diet, perfect quietude, and free purgation, are usually sufficient to overcome this temporary excitement; but the application of a blister, or of leeches, or cupping, is sometimes necessary.

The attacks of coma or somnolency, that belong to this disorder, are but little under the control of remedies. Copious venesection has seldom any influence in arresting the attack, but usually places the patient in a worse condition. The fit may occasionally depend upon acrid ingesta, and terminate when a free evacuation from the bowels is obtained. But it frequently comes on without evident cause, and is not arrested by any kind of treatment.

The condition of the other viscera will require attention in all cases of this description. It is especially necessary to examine into the state of the heart and large vessels, aggravation of the cerebral symptoms commonly commencing in some disturbance of the central organ of the circulation. Generally it is deficient vigor of the heart's action, or obstructive lesion that exists. The blood is sent to the brain in insufficient quantity, and vertigo and a tendency to syncope, are thus induced; a tonic remedy—the quinine, the mineral acids, or some diffusible stimulant, such as gentian and ammonia, will often give temporary relief to the symptoms.

The digestive organs, likewise, require the strictest attention. The appetite is generally good, and there is often a craving for food, which the patient may not have sufficient discretion to keep under control. But the diet need not be too sparing, provided food is selected easy of digestion; and even a glass or two of wine might be allowed daily, and is often beneficial.

One great difficulty in the chronic cases is the regulation of the bowels. Aperient medicine is generally required, and the mildest that will answer the purpose should be employed. Two or three teaspoonfuls of castor oil, taken before breakfast, or an aloetic pill or two at night, may procure a daily evacuation.

Exercise in the open air is requisite; but in this and all other circumstances, it is necessary to avoid a feeling of exhaustion, which is almost certain to be followed by evil consequences; when exercise can be taken, therefore, it must be used in moderation; and for the same reason, the intervals without food should not be much prolonged.

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